RICHEY

ALUMINIUM ELECTROLYTIC CAPACITORS

Represented by:

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RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS

PART NUMBERING SYSTEM

LC – 1625 – 1000 – 35 – T – XX

- TYPE
- CASE CODE (NOTE 1)
- CAPACITANCE – MFD
- WORKING VOLTAGE
- CAPACITANCE TOLERANCE (NOTE 2)
- SPECIAL REQUIREMENTS (NOTE 3)

NOTE 1 – CASE CODE. THE FIRST TWO DIGITS ARE CASE DIAMETER AND SECOND TWO DIGITS ARE CASE LENGTH IN MILLIMETRES. DECIMAL DIMENSIONS WHERE APPLICABLE ARE NOT USED IN THE CASE CODE.
METRIC DIMENSIONS ARE SHOWN IN BOLD PRINT EQUIVALENT INCH DIMENSION ARE SHOWN BELOW.

NOTE 2 – CAPACITANCE TOLERANCE

T	–10% +50%	Q	–10% +30%
U	–10% +75%	M	–20% +20%
W	–10% +100%	K	–10% +10%

NOTE 3 – SPECIAL REQUIREMENTS

- E – EPOXY END SEAL. ADD 1 MM TO CASE LENGTH FOR RADIAL LEAD UNITS 5, 6 & 8 MM DIAMETER
- V – VENTED CAN
- R – TAPE & REEL
- C – CUT LEADS
- FC – FORM AND CUT LEADS
- D – INSULATING DISC
- PS – 2 TERMINAL SNAP IN TYPE
- PS3 – 3 TERMINAL SNAP IN TYPE
- PS4 – 4 TERMINAL SNAP IN TYPE
- SL – SOLDER LUG
- PC – 2 TERMINAL PC PIN TYPE
- PC3 – 3 TERMINAL PC PIN TYPE
- PC4 – 4 TERMINAL PC PIN TYPE

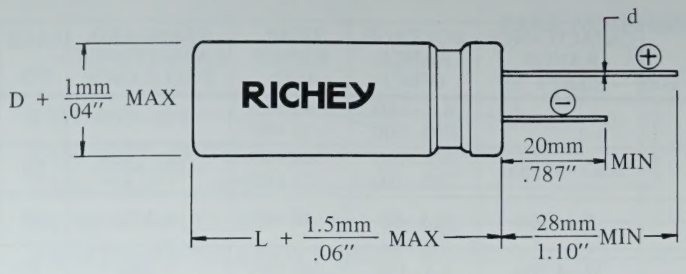
RICHEY SPECIALIZES EXCLUSIVELY IN THE MANUFACTURING OF ALUMINIUM ELECTROLYTIC CAPACITORS AND HAS THE ENGINEERING EXPERTISE TO SOLVE YOUR SPECIAL DESIGN AND APPLICATION PROBLEMS.

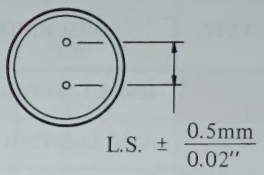
RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS

TYPE	DESCRIPTION	CAPACITANCE RANGE (μF)	VOLTAGE RANGE (VDC)	TEMP. RANGE (°C)	STANDARD CAPACITANCE TOLERANCE	PAGE NO.
LC	Radial Lead-Polar	0.1–33,000	6.3–160 200–500	–40 +85 –25 +85	–10% +50%	2
MDI	Axial Lead-Polar	0.47–33,000	6.3–160 200–500	–40 +85 –25 +85	–10% +50%	10
SM	Radial Lead-Polar Super-miniature	0.1–100	6.3–50	–40 +85	± 20%	18
LP	Radial Lead-Polar Low Profile	33–4,700	6.3–100	–40 +85	± 20%	20
LCL	Radial Lead-Polar Low D.C. Leakage Current	0.1–4,700	6.3–100	–40 +85	± 20%	22
MDIL	Axial Lead-Polar Low D.C. Leakage Current	0.1–10,000	6.3–100	–40 +85	± 20%	26
HFR	Radial Lead-Polar 105°C	0.1–10,000	6.3–100	–40 +105	± 20%	30
HFA	Axial Lead-Polar 105°C	0.47–10,000	6.3–100	–40 +105	± 20%	34
PSR	Radial Lead-Polar 105°C Low Impedance and ESR High Ripple at High Freq.	2.2–1,000	6.3–100	–40 +105	± 20%	38
PSRX	Radial Lead-Polar 105°C Low Impedance and ESR Smaller size and extended cap range compared to type PSR	4.7–4,700	6.3–100	–40 +105	± 20%	42
NC	Radial Lead-Non Polar	1–10,000	6.3–160	–40 +85	–10% +50%	48
NA	Axial Lead-Non Polar	1–4,700	6.3–160	–40 +85	–10% +50%	51
NC (L)	Radial Lead-Non Polar For Crossover Network	1–330	25–100	–40 +85	± 20% At 1 KHz	54
NA (L)	Axial Lead-Non Polar For Crossover Network	1–330	25–100	–40 +85	± 20% At 1 KHz	56
NC (TV)	Radial Lead-Non Polar For T.V. Horizontal Deflection Current Correction	2.2–10	25	–25 +85	± 20%	61
LCT	Radial Lead-Polar With Auxiliary Lead	33–33,000	6.3–160 200–500	–40 +85 –25 +85	–10% +50%	62
RLB	Vertical Mounting Bracket	100–10,000	6.3–160	–40 +85	–10% +50%	66
TR	Large Can	22–22,000	16–160 200–500	–40 +85 –25 +85	–10% +50%	68
TRS	Large Can Low Profile	220–15,000	16–160 200–250	–40 +85 –25 +85	–10% +50%	73
CT	Computer Grade	100–390,000	10–160 200–450	–40 +85 –25 +85	–10% +75% –10% +50%	

RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE LC LOW VOLTAGE

RADIAL LEAD POLAR GENERAL PURPOSE





SEE CHART

LEAD DIMENSIONS:

D	5	6	8	10	13	16	18	22	25	30
	.197	.236	.315	.394	.512	.630	.709	.866	.984	1.181
L.S.	2.0	2.5	3.5	5.0	5.0 6.5 7.5	7.5	7.5	10	12.5	15
	.08	.098	.138	.197	.197 .256.295	.295	.295	.394	.492	.590
d	0.5	0.5	0.5	0.6	0.6 0.8 0.6	0.8	0.8	1.0	1.0	1.0
	.020	.020	.020	.024	.024 .031.024	.031	.031	.04	.04	.04

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 100V
OPERATING TEMPERATURE	–40 °C +85 °C
CAPACITANCE RANGE	0.1 μF – 33000 μF
CAPACITANCE TOLERANCE	–10% +50% (T) 120HZ 25°C *OTHER TOLERANCES AVAILABLE UPON REQUEST*
LEAKAGE CURRENT *AFTER 5 MINUTES*	0.02CV +3μA MAXIMUM

DISSIPATION FACTOR: TAN δ AT 25°C 120HZ.

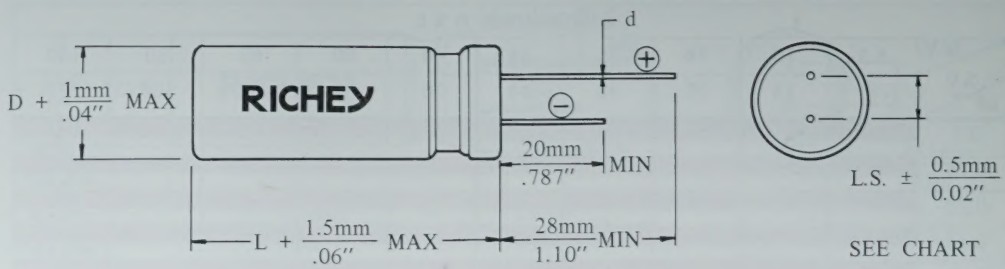
W.V.	6.3	10	16	25	35	40	50	63	80	100
TAN δ	0.25	0.20	0.17	0.15	0.12	0.12	0.10	0.10	0.09	0.08

Tan δ values to be increased by 0.02 per 1000 μF for capacitance values greater than 1000 μF.

DIMENSIONS D X L										
W.V. / S.V. / μF	6.3 / 8	10 / 13	16 / 20	25 / 32	35 / 44	40 / 50	50 / 63	63 / 80	80 / 100	100 / 125
0.1	→	→	→	→	→	→	→	→	→	5x11 .197x.433
0.15	→	→	→	→	→	→	→	→	→	5x11 .197x.433
0.22	→	→	→	→	→	→	→	→	→	5x11 .197x.433
0.33	→	→	→	→	→	→	→	→	→	5x11 .197x.433
0.47	→	→	→	→	→	→	→	→	→	5x11 .197x.433
0.68	→	→	→	→	→	→	→	→	→	5x11 .197x.433
1	→	→	→	→	→	→	→	→	→	5x11 .197x.433
1.5	→	→	→	→	→	→	→	→	→	5x11 .197x.433
2.2	→	→	→	→	→	→	→	→	→	5x11 .197x.433
3.3	→	→	→	→	→	→	→	→	→	5x11 .197x.433
4.7	→	→	→	→	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433
6.8	→	→	→	→	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433
10	→	→	→	→	→	→	5x11 .197x.433	6x11 .236x.433	8x11.5 .315x.453	8x11.5 .315x.453
15	→	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	6x11 .236x.433	8x11.5 .315x.453	8x11.5 .315x.453
22	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x11.5 .315x.453	8x11.5 .315x.453	10x12.5 .394x.492	10x12.5 .394x.492
33	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x11.5 .315x.453	8x11.5 .315x.453	8x11.5 .315x.453	10x16 .394x.630	10x16 .394x.630
47	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x11.5 .315x.453	8x11.5 .315x.453	8x11.5 .315x.453	10x12.5 .394x.492	10x20 .394x.787	10x20 .394x.787
68	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x11.5 .315x.453	8x11.5 .315x.453	8x11.5 .315x.453	10x12.5 .394x.492	10x16 .394x.630	10x20 .394x.787	10x26 .394x.1.024
100	6x11 .236x.433	6x11 .236x.433	8x11.5 .315x.453	8x11.5 .315x.453	10x12.5 .394x.492	10x12.5 .394x.492	10x16 .394x.630	10x20 .394x.787	10x26 .394x1.024	13x20 .512x.787
150	8x11.5 .315x.453	8x11.5 .315x.453	8x11.5 .315x.453	10x12.5 .394x.492	10x16 .394x.630	10x20 .394x.787	10x20 .394x.787	10x26 .394x1.024	13x20 .512x.787	13x26 .512x1.024
220	8x11.5 .315x.453	8x11.5 .315x.453	10x12.5 .394x.492	10x16 .394x.630	10x20 .394x.787	10x20 .394x.787	10x26 .394x1.024	13x20 .512x.787	13x26 .512x1.024	13x30.5 .512x1.201
330	10x12.5 .394x.492	10x12.5 .394x.492	10x16 .394x.630	10x20 .394x.787	10x26 .394x1.024	10x26 .394x1.024	13x20 .512x.787	13x30 .512x1.181	16x25 .630x.984	16x31 .630x1.220
470	10x12.5 .394x.492	10x16 .394x.630	10x20 .394x.787	10x26 .394x1.024	13x20 .512x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	16x38 .630x1.496
680	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x20 .512x.787	13x30 .512x1.181	13x30 .512x1.181	16x25 .630x.984	16x31 .630x1.220	18x40 .709x1.575	22x40 .866x1.575
1000	10x20 .394x.787	10x26 .394x1.024	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	16x31 .630x1.220	16x38 .630x1.496	22x40 .866x1.575	25x40 .984x1.575
1500	13x20 .512x.787	13x26 .512x1.024	13x26 .512x1.024	16x31 .630x1.220	16x38 .630x1.496	16x38 .630x1.496	16x51 .630x2.008	22x40 .866x1.575	25x40 .984x1.575	25x51 .984x2.008
2200	13x26 .512x1.024	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	18x34 .709x1.339	18x34 .709x1.339	22x40 .866x1.575	25x40 .984x1.575	25x51 .984x2.008	30x51 1.181x2.008
3300	13x30 .512x1.181	16x31 .630x1.220	16x31 .630x1.220	18x34 .709x1.339	22x40 .866x1.575	22x40 .866x1.575	25x40 .984x1.575	25x51 .984x2.008	30x51 1.181x2.008	30x64 1.181x2.520
4700	16x31 .630x1.220	16x31 .630x1.220	16x38 .630x1.496	22x40 .866x1.575	25x40 .984x1.575	25x51 .984x2.008	25x51 .984x2.008	30x51 1.181x2.008	30x64 1.181x2.520	
6800	16x38 .630x1.496	16x45 .630x1.771	22x40 .866x1.575	25x40 .984x1.575	25x51 .984x2.008	25x64 .984x2.520	30x51 1.181x2.008	30x64 1.181x2.520		
10000	18x40 .709x1.575	18x40 .709x1.575	25x40 .984x1.575	25x64 .984x2.520	30x64 1.181x2.520	30x64 1.181x2.520				
15000	25x40 .984x1.575	25x51 .984x2.008	25x64 .984x2.520	30x64 1.181x2.520						
22000	25x51 .984x2.008	25x64 .984x2.520	30x64 1.181x2.520							
33000	25x64 .984x2.520	30x64 1.181x2.520								

RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE LC HIGH VOLTAGE

RADIAL LEAD POLAR HIGH VOLTAGE GENERAL PURPOSE



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LEAD DIMENSIONS:

D	5	6	8	10	13	16	18	22	25	30
	.197	.236	.315	.394	.512	.630	.709	.866	.984	1.181
L.S.	2.0	2.5	3.5	5.0	5.0 6.5 7.5	7.5	7.5	10	12.5	15
	.08	.098	.138	.197	.197 .256.295	.295	.295	.394	.492	.590
d	0.5	0.5	0.5	0.6	0.6 0.8 0.6	0.8	0.8	1.0	1.0	1.0
	.020	.020	.020	.024	.024 .031.024	.031	.031	.04	.04	.04

SPECIFICATIONS:

VOLTAGE RANGE	160V – 500V
OPERATING TEMPERATURE	160V −40°C +85°C 200V – 500V −25°C +85°C
CAPACITANCE RANGE	1 μF – 680 μF
CAPACITANCE TOLERANCE	−10% +50% (T) 120HZ 25° C *OTHER TOLERANCES AVAILABLE UPON REQUEST*
LEAKAGE CURRENT	0.03CV +15 μA MAXIMUM CV≤1000
AFTER 5 MINUTES	0.02CV +25 μA MAXIMUM CV>1000

DISSIPATION FACTOR: TAN δ AT 25°C 120HZ.

W.V.	160	200	250	350	400	450	500
TAN δ	0.10	0.15	0.20	0.20	0.20	0.20	0.20

DIMENSIONS D X L									
W.V. / S.V. / µF	160 / 185	200 / 250	250 / 300	350 / 400	400 / 450	450 / 500	500 / 550		
1	5x12 / .197x.472	8x17 / .315x.669	8x17 / .315x.669	8x17 / .315x.669	10x17 / .394x.669	10x17 / .394x.669	10x17 / .394x.669		
1.5	6x12 / .236x.472	8x17 / .315x.669	8x17 / .315x.669	8x17 / .315x.669	10x17 / .394x.669	10x17 / .394x.669	10x21 / .394x.827		
2.2	6x12 / .236x.472	8x17 / .315x.669	8x17 / .315x.669	10x17 / .394x.669	10x17 / .394x.669	10x21 / .394x.827	10x27 / .394x1.063		
3.3	8x13 / .315x.512	8x17 / .315x.669	10x17 / .394x.669	10x17 / .394x.669	10x21 / .394x.827	10x27 / .394x1.063	13x27 / .512x1.063		
4.7	8x13 / .315x.512	10x17 / .394x.669	10x17 / .394x.669	10x21 / .394x.287	10x27 / .394x1.063	13x27 / .512x1.063	13x27 / .512x1.063		
6.8	10x12 / .394x.472	10x17 / .394x.669	10x21 / .394x.827	10x27 / .394x1.063	13x21 / .512x.827	13x27 / .512x1.063	13x31 / .512x1.200		
10	10x16 / .394x.630	10x21 / .394x.827	10x21 / .394x.827	13x27 / .512x1.063	13x27 / .512x1.063	13x31 / .512x1.200	16x32 / .630x1.260		
15	10x21 / .394x.787	10x27 / .394x1.063	13x21 / .512x.827	13x27 / .512x1.063	13x31 / .512x1.200	16x32 / .630x1.260	16x39 / .630x1.535		
22	10x26 / .394x1.024	13x21 / .512x.287	13x27 / .512x1 063	16x26 / .630x1.024	16x32 / .630x1.260	18x35 / .709x1.378	22x40 / .866x1.575		
33	13x20 / .512x.787	13x27 / .512x1.063	13x31 / .512x1.200	16x32 / .630x1.260	16x39 / .630x1.535	18x41 / .709x1.614	18x56 / .709x2.205		
47	13x30.5 / .512x1.201	13x31 / .512x1.200	16x32 / .630x1.260	16x45 / .630x1.772	18x50 / .709x1.968	18x50 / .709x1.968	22x59 / .866x2.323		
68	16x31 / .630x1.220	16x32 / .630x1.260	16x39 / .630x1.535	18x50 / .709x1.968	22x53 / .866x2.087	22x59 / .866x2.323	25x65 / .984x2.559		
100	16x31 / .630x1.220	16x45 / .630x1 772	18x40 / .709x1.575	22x53 / .866x2.087	22x59 / .866x2.323	25x65 / .984x2.559			
150	18x40 / .709x1.575	18x50 / .709x1.968	22x53 / .866x2.087	25x52 / .984x2.047	25x65 / .984x2.559				
220	22x40 / .866x1.575	22x53 / .866x2.087	25x51 / .984x2.008						
330	22x51 / .866x2.008	25x51 / .984x2.008	25x65 / .984x2 559						
470	25x64 / .984x2.520	25x65 / .984x2.559							
680	30x64 / 1.181x2.520								

PERMISSIBLE RIPPLE CURRENTS mA RMS MAXIMUM AT 120HZ 85°C

μF \ W.V.	6.3	10	16	25	35	40	50	63	80	100	160	200	250	350	400	450	500
0.1	→								→	1.2							
0.15	→								→	2							
0.22	→								→	2.7							
0.33	→								→	4							
0.47	→								→	5							
0.68	→								→	9							
1	→								→	12	13	20	16	16	18	18	18
1.5	→								→	17	17	24	20	20	22	22	25
2.2	→								→	21	21	29	24	27	27	30	33
3.3	→								→	26	31	36	33	33	37	40	47
4.7	→						→	26	29	34	37	49	40	44	48	56	56
6.8	→					→	24	37	39	50	53	59	53	58	68	68	72
10	→					→	29	45	58	61	70	79	64	83	83	88	101
15	→		→	24	50	50	67	67	71	89	95	106	92	101	108	124	133
22	→		→	45	61	61	81	81	102	108	126	137	123	137	150	172	182
33	→	→	49	67	75	91	99	99	135	143	165	184	160	183	198	235	247
47	→	62	75	75	108	108	119	141	177	188	230	234	219	252	280	323	336
68	67	83	90	102	155	155	170	183	213	249	318	323	284	337	388	405	456
100	101	101	133	142	179	179	206	245	285	322	386	450	389	471	491	553	
150	150	150	193	222	226	300	300	331	371	432	558	614	577	618	677		
220	182	182	234	269	332	332	401	527	493	558	748	856	734				
330	265	265	310	364	448	448	523	610	676	684	1022	1230	1004				
470	282	341	408	478	570	570	695	765	883	1021	1456	1468					
680	367	452	476	613	802	802	807	1007	1145	1083	1950						
1000	490	604	698	827	1020	1115	1221	1318	1313	1420							
1500	692	844	911	1182	1415	1415	1668	1520	1730	1910							
2200	815	999	1202	1389	1651	1651	1707	2000	2310	2589							
3300	1136	1432	1531	1755	2142	2142	2440	2680	3170	3467							
4700	1308	1532	1826	2132	2770	3063	3200	3589	4138								
6800	1786	2051	2640	3130	3670	4043	4317	4721									
10000	2138	2302	3210	3210	4190	5460											
15000	3015	3630	4750	5725													
22000	4013	4823	6419														
33000	5393	6577															

EQUIVALENT SERIES RESISTANCE (Ω) MAX. AT 120Hz 25°C										
μF \ W.V.	6.3	10	16	25	35	40	50	63	80	100
0.1	→	→	→	→	→	→	→	→	→	1179
0.15	→	→	→	→	→	→	→	→	→	786.0
0.22	→	→	→	→	→	→	→	→	→	535.9
0.33	→	→	→	→	→	→	→	→	→	357.3
0.47	→	→	→	→	→	→	→	→	→	250.8
0.68	→	→	→	→	→	→	→	→	→	173.4
1	→	→	→	→	→	→	→	→	→	117.9
1.5	→	→	→	→	→	→	→	→	→	78.60
2.2	→	→	→	→	→	→	→	→	→	53.59
3.3	→	→	→	→	→	→	→	→	→	35.73
4.7	→	→	→	→	→	→	→	31.35	28.22	25.08
6.8	→	→	→	→	→	→	→	21.67	19.50	17.34
10	→	→	→	→	→	→	14.74	14.74	13.26	11.79
15	→	→	→	→	11.79	11.79	9.824	9.824	8.842	7.860
22	→	→	→	10.05	8.038	8.038	6.698	6.698	6.029	5.359
33	→	→	7.592	6.698	5.359	5.359	4.466	4.466	4.019	3.573
47	→	6.271	5.330	4.703	3.763	3.763	3.135	3.135	2.822	2.508
68	5.418	4.334	3.684	3.251	2.601	2.601	2.167	2.167	1.950	1.734
100	3.684	2.947	2.505	2.210	1.768	1.768	1.474	1.474	1.326	1.179
150	2.456	1.965	1.670	1.474	1.179	1.179	.9824	.9824	.8842	.7860
220	1.675	1.340	1.139	1.005	.8038	.8038	.6698	.6698	.6029	.5359
330	1.116	.8931	.7592	.6698	.5359	.5359	.4466	.4466	.4019	.3573
470	.7839	.6271	.5330	.4703	.3763	.3763	.3135	.3135	.2822	.2508
680	.5418	.4334	.3684	.3251	.2601	.2601	.2167	.2167	.1950	.1734
1000	.3684	.2947	.2505	.2210	.1768	.1768	.1474	.1474	.1326	.1179
1500	.2554	.2063	.1768	.1572	.1277	.1277	.1081	.1081	.0982	.0884
2200	.1809	.1474	.1273	.1139	.0938	.0938	.0804	.0804	.0737	.0670
3300	.1295	.1072	.0938	.0848	.0715	.0715	.0625	.0625	.0581	.0536
4700	.1035	.0878	.0784	.0721	.0627	.0627	.0564	.0564	.0533	
6800	.0802	.0693	.0628	.0585	.0520	.0520	.0477	.0477		
10000	.0634	.0560	.0516	.0486	.0442	.0442				
15000	.0521	.0472	.0422	.0422						
22000	.0449	.0415	.0395							
33000	.0397	.0375								

LOW TEMPERATURE CHARACTERISTICS:

IMPEDANCE (Z) RATIO AT 120 Hz SHALL NOT EXCEED THESE FIGURES										
W. V.	6.3	10	16	25	35	40	50	63	80	100
Z–25°C/Z+25°C	4	3	2	2	2	2	2	2	2	2
Z–40°C/Z+25°C	8	6	4	4	3	3	3	3	3	3

EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz 25°C										
μF \ W.V.	160	200	250	350	400	450	500			
1	147.4	221.0	294.7	294.7	294.7	294.7	294.7			
1.5	98.24	147.4	196.5	196.5	196.5	196.5	196.5			
2.2	66.98	100.5	134.0	134.0	134.0	134.0	134.0			
3.3	44.66	66.98	89.31	89.31	89.31	89.31	89.31			
4.7	31.35	47.03	62.71	62.71	62.71	62.71	62.71			
6.8	21.67	32.51	43.34	43.34	43.34	43.34	43.34			
10	14.74	22.10	29.47	29.47	29.47	29.47	29.47			
15	9.824	14.74	19.65	19.65	19.65	19.65	19.65			
22	6.698	10.05	13.40	13.40	13.40	13.40	13.40			
33	4.466	6.698	8.931	8.931	8.931	8.931	8.931			
47	3.135	4.703	6.271	6.271	6.271	6.271	6.271			
68	2.167	3.251	4.334	4.334	4.334	4.334	4.334			
100	1.474	2.210	2.947	2.947	2.947	2.947				
150	.9824	1.474	1.965	1.965	1.965					
220	.6698	1.005	1.340							
330	.4466	.6698	.8931							
470	.3135	.4703								
680	.2167									

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES										
W.V.	160	200	250	350	400	450	500			
Z–25°C/Z+20°C	2	8	8	12	16	16				
Z–40°C/Z+20°C	3									

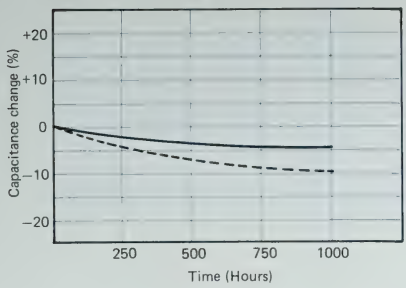
TYPICAL TEST DATA

– – – – 220μF 25V

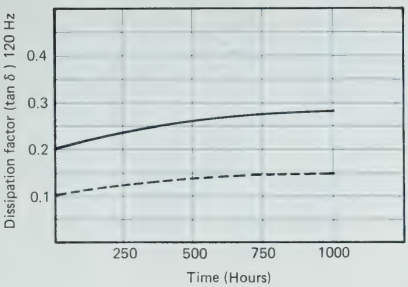
——— 4700μF 16V

LIFE TEST

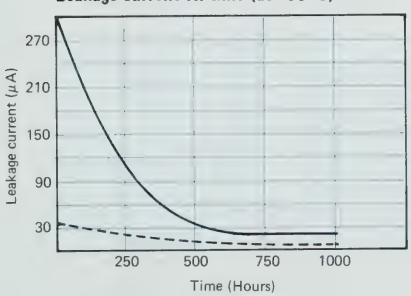
Capacitance change vs. time (at +85°C)



Dissipation factor vs. time (at +85°C)

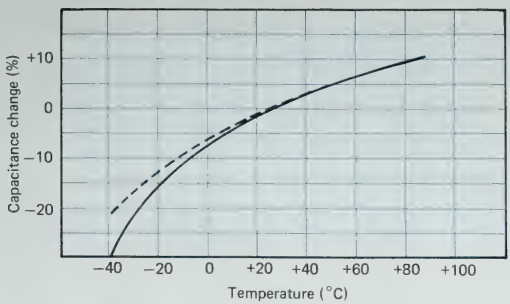


Leakage current vs. time (at +85°C)

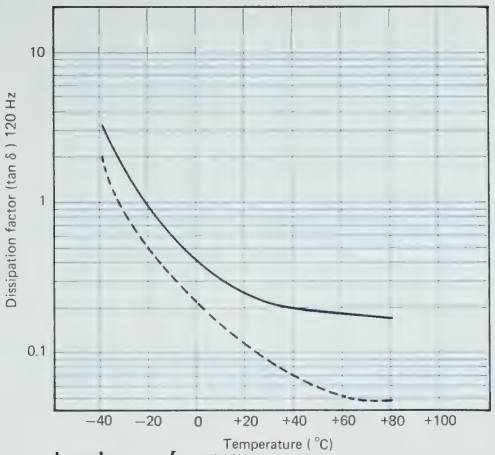


TEMPERATURE CHARACTERISTICS

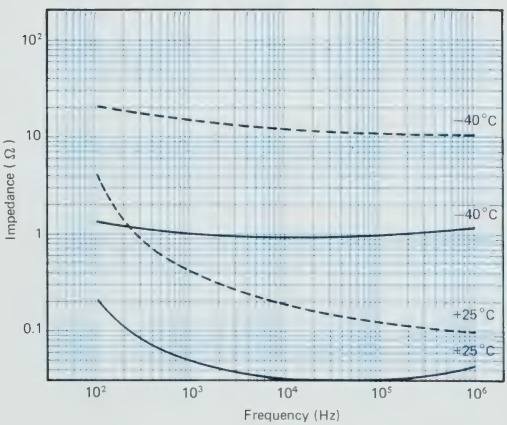
Capacitance change vs. temperature



Dissipation factor vs. temperature

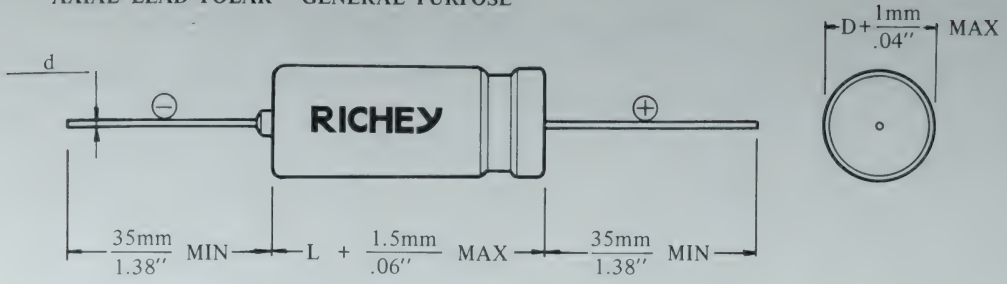


Impedance vs. frequency



RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE MDI LOW VOLTAGE

AXIAL LEAD POLAR - GENERAL PURPOSE



LEAD DIMENSIONS:

D	5	6	8	10	13	16	18	22	25	30
	.197	.236	.315	.394	.512	.630	.709	.866	.984	1.181
d	0.6	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.8
	.024	.024	.024	.024	.031	.031	.031	.031	.031	.031

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 100V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	0.47 μF – 33000 μF
CAPACITANCE TOLERANCE	–10% +50% (T) 120HZ 25°C *OTHER TOLERANCES AVAILABLE UPON REQUEST*
LEAKAGE CURRENT *AFTER 5 MINUTES*	0.02CV +3μA MAXIMUM

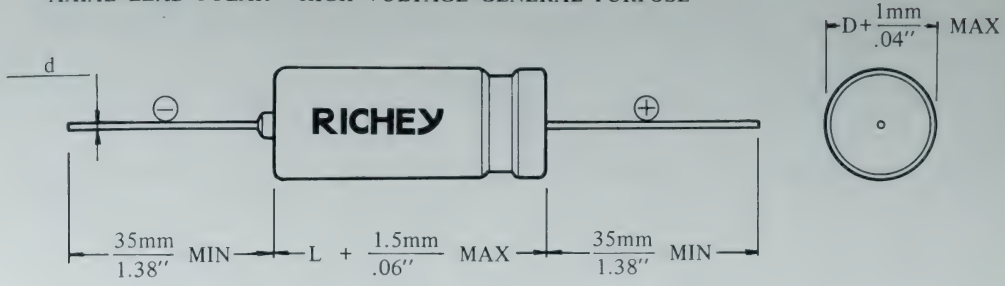
DISSIPATION FACTOR: TAN δ AT 25°C 120HZ.

W.V.	6.3	10	16	25	35	40	50	63	80	100
TAN δ	0.25	0.20	0.17	0.15	0.12	0.12	0.10	0.10	0.09	0.08

Tan δ values to be increased by 0.02 per 1000 μF for capacitance values greater than 1000 μF.

DIMENSIONS D X L										
W.V. / S.V. / μF	6.3	10	16	25	35	40	50	63	80	100
	8	13	20	32	44	50	63	80	100	125
0.47	→	→	→	→	→	→	→	→	→	5x12 .197x.472
1	→	→	→	→	→	→	→	→	→	5x12 .197x.472
1.5	→	→	→	→	→	→	→	→	5x12 .197x.472	6x12 .236x.472
2.2	→	→	→	→	→	→	→	→	5x12 .197x.472	6x12 .236x.472
3.3	→	→	→	→	→	→	→	→	5x12 .197x.472	6x16 .236x.630
4.7	→	→	→	→	→	→	5x12 .197x.472	6x12 .236x.472	6x12 .236x.472	6x16 .236x.630
6.8	→	→	→	→	→	→	5x12 .197x.472	6x12 .236x.472	6x12 .236x.472	6x16 .236x.630
10	→	→	→	5x12 .197x.472	6x12 .236x.472	6x12 .236x.472	6x12 .236x.472	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630
15	→	→	→	5x12 .197x.472	6x12 .236x.472	6x12 .236x.472	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630
22	→	→	5x12 .197x.472	6x12 .236x.472	6x16 .236x.630	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787
33	→	5x12 .197x.472	6x12 .236x.472	6x12 .236x.472	6x16 .236x.630	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787
47	→	5x12 .197x.472	6x12 .236x.472	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x16 .315x.787	8x16 .315x.787	8x20 .394x.827	10x21 .394x.827
68	→	6x12 .236x.472	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630	8x20 .315x.787	8x20 .315x.787	10x21 .394x.827	10x21 .394x.827	10x24 .394x.945
100	6x12 .236x.472	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630	8x20 .315x.787	8x20 .315x.787	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181
150	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	10x21 .394x.827	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	13x32 .512x1.260
220	8x16 .315x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x32 .512x1.260	13x36 .512x1.417
330	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x24 .394x.945	10x30 .394x1 181	13x32 .512x1.260	13x36 .512x1 417	16x32 .630x1 260
470	8x20 .315x.787	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	10x30 .394x1.181	13x24 .512x.945	13x36 .512x1.417	16x32 .630x1.260	16x40 .630x1.575
680	10x21 .394x.827	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x32 .512x1.260	13x32 .512x1.260	13x32 .512x1.260	16x40 .630x1.575	16x48 .630x1.890	18x53 .709x2.087
1000	10x24 .394x.945	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	13x32 .512x1.260	13x36 .512x1.417	13x40 .512x1.575	16x48 .630x1.890	18x40 .709x1.575	22x51 .866x2.008
1500	10x30 .394x1.181	13x24 .512x.945	13x32 .512x1 260	13x36 .512x1 417	16x40 .630x1.575	16x48 .630x1 890	18x40 .709x1.575	22x40 .866x1.575	22x51 .866x2 008	25x60 .984x2 362
2200	13x24 .512x .945	13x24 .512x.945	13x32 .512x1.260	16x32 .630x1.260	16x40 .630x1.575	16x48 .630x1.890	18x53 .709x2.087	22x51 .866x2.008	25x60 .984x2.362	25x65 .984x2.559
3300	13x32 .512x1.260	13x36 .512x1.417	16x32 .630x1.260	16x40 .630x1.575	18x53 .709x2.087	18x53 .709x2.087	22x51 .866x2.008	25x51 .984x2.008	30x60 1.181x2.362	
4700	13x36 .512x1.417	16x32 .630x1 260	16x40 .630x1 575	18x53 709x2.087	22x51 .866x2 008	22x51 .866x2.008	25x60 .984x2 362	30x60 1.181x2 362		
6800	16x40 .630x1.575	18x40 .709x1.575	22x40 .866x1.575	22x51 .866x2.008	25x60 .984x2.362	25x60 .984x2.362	25x65 .984x2.559			
10000	16x51 .630x2.008	18x53 .709x2 087	22x51 .866x2.008	25x60 .984x2.362	25x65 .984x2.559	25x65 .984x2.559				
15000	22x51 .866x2.008	25x51 .984x2.008	25x60 .984x2 362	30x60 1.181x2.362	30x60 1.181x2.362	30x60 1.181x2.362				
22000	25x51 .984x2.008	30x60 1.181x2 362	30x60 1 181x2.362							
33000	30x60 1.181x2 362									

AXIAL LEAD POLAR - HIGH VOLTAGE GENERAL PURPOSE



LEAD DIMENSIONS:

D	5	6	8	10	13	16	18	22	25	30
	.197	.236	.315	.394	.512	.630	.709	.866	.984	1.181
d	0.6	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.8
	.024	.024	.024	.024	.031	.031	.031	.031	.031	.031

SPECIFICATIONS:

VOLTAGE RANGE	160V – 500V
OPERATING TEMPERATURE	160V –40°C +85°C 200V – 500V –25°C +85°C
CAPACITANCE RANGE	0.47μF – 680μF
CAPACITANCE TOLERANCE	–10% +50% (T) 120HZ 25°C *OTHER TOLERANCES AVAILABLE UPON REQUEST*
LEAKAGE CURRENT	0.03CV +15μA MAXIMUM CV≤1000
AFTER 5 MINUTES	0.02CV +25μA MAXIMUM CV>1000

DISSIPATION FACTOR: TAN δ AT 25°C 120HZ.

W.V.	160	200	250	350	400	450	500
TAN δ	0.10	0.15	0.20	0.20	0.20	0.20	0.20

DIMENSIONS D X L									
W.V. / S.V. / μF	160 / 185	200 / 250	250 / 300	350 / 400	400 / 450	450 / 500	500 / 550		
0.47	6x14 .236x.551								
1	6x14 .236x.551	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827		
1.5	6x14 .236x.551	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	8x20 .315x.787	10x24 .394x.945		
2.2	6x14 .236x.551	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945		
3.3	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181		
4.7	8x16 .315x.630	8x20 .315x.787	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x32 .512x1.260		
6.8	8x20 .315x.787	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	13x32 .512x1.260		
10	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x32 .512x1.260	13x32 .512x1.260	13x40 .512x1.575		
15	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x32 .512x1.260	13x32 .512x1.260	16x32 .630x1.260	16x40 .630x1.575		
22	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	13x36 .512x1.417	16x32 .630x1.260	16x40 .630x1.575	16x51 .630x2.008		
33	10x30 .394x1.181	13x32 .512x1.260	13x32 .512x1.260	16x32 .630x1.260	16x47 .630x1.850	18x53 .709x2.087	18x57 .709x2.244		
47	13x32 .512x1.260	13x32 .512x1.260	13x40 .512x1.575	16x40 .630x1.575	18x53 .709x2.087	22x40 .866x1.575	25x47 .984x1.850		
68	13x36 .512x1.417	16x32 .630x1.260	16x40 .630x1.575	18x53 .709x2.087	22x51 .866x2.008	22x51 .866x2.008	25x59 .984x2.323		
100	16x32 .630x1.260	16x40 .630x1.575	18x53 .709x2.087	22x51 .866x2.008	22x65 .866x2.559	25x65 .984x2.559			
150	18x40 .709x1.575	18x57 .709x2.244	22x51 .866x2.008	22x65 .866x2.559	25x65 .984x2.559				
220	18x53 .709x2.087	22x51 .866x2.008	22x65 .866x2.559	25x65 .984x2.559					
330	22x51 .866x2.008	22x65 .866x2.559	25x65 .984x2.559						
470	25x51 .984x2.008	25x65 .984x2.559							
680	30x60 1.181x2.362								

PERMISSIBLE RIPPLE CURRENTS mA RMS MAXIMUM AT 120HZ 85°C

µF \ W.V.	6.3	10	16	25	35	40	50	63	80	100	160	200	250	350	400	450	500
0.47	→	→	→	→	→	→	→	→	→	5							
1	→	→	→	→	→	→	→	→	→	12	15	16	13	16	17	17	20
1.5	→	→	→	→	→	→	→	→	15	17	20	20	19	19	21	25	26
2.2	→	→	→	→	→	→	→	→	18	21	24	29	23	25	25	30	31
3.3	→	→	→	→	→	→	→	→	22	30	35	35	31	31	36	39	43
4.7	→	→	→	→	→	→	26	32	34	39	46	46	37	44	46	51	61
6.8	→	→	→	→	→	→	26	36	41	47	55	55	53	56	61	73	73
10	→	→	→	25	35	35	35	51	54	68	67	78	67	75	89	89	97
15	→	→	→	36	53	53	63	63	79	84	96	101	91	109	109	125	134
22	→	→	33	53	70	70	76	91	96	111	122	136	118	139	151	175	181
33	→	49	60	77	86	86	111	111	117	136	166	197	161	186	215	241	248
47	→	65	70	91	121	121	133	133	153	189	235	235	211	238	287	318	332
68	→	87	103	103	146	160	175	204	215	241	299	321	287	346	382	425	438
100	95	116	125	158	194	194	212	247	275	323	388	426	419	464	515	555	
150	142	142	182	194	277	277	320	354	398	470	558	649	568	631	679		
220	204	204	221	257	335	335	388	429	537	602	760	843	764	823			
330	249	249	296	367	433	433	525	624	695	789	1115	1147	936				
470	326	326	411	463	572	572	669	800	888	1031	1437	1473					
680	456	456	523	615	818	818	896	1110	1259	1495	2057						
1000	585	585	701	796	992	1066	1193	1447	1521	1447							
1500	694	824	992	1130	1446	1554	1767	1526	1773	2029							
2200	826	975	1169	1398	1687	1812	2196	2037	2458	2567							
3300	1159	1369	1541	1773	2329	2364	2494	2770	3144								
4700	1415	1622	1883	2371	2838	2838	3305	4070									
6800	1824	2103	2456	2924	3908	3908	4281										
10000	2275	2632	3283	3937	4950	4950											
15000	3019	3630	4602	5680													
22000	4013	5234	6256														
33000	5849																

EQUIVALENT SERIES RESISTANCE (Ω) MAX. AT 120 Hz 25 °C										
μF \ W.V.	6.3	10	16	25	35	40	50	63	80	100
0.47										250.8
1										117.9
1.5									88.42	78.60
2.2									60.29	53.59
3.3									40.19	35.73
4.7							31.35	31.35	28.22	25.08
6.8							21.67	21.67	19.50	17.34
10				22.10	17.68	17.68	14.74	14.74	13.26	11.79
15				14.74	11.79	11.79	9.824	9.824	8.842	7.860
22			11.39	10.05	8.038	8.038	6.698	6.698	6.021	5.359
33		8.931	7.592	6.698	5.359	5.359	4.466	4.466	4.019	3.573
47		6.271	5.330	4.703	3.763	3.763	3.135	3.135	2.822	2.508
68		4.334	3.684	3.251	2.601	2.601	2.167	2.167	1.950	1.734
100	3.684	2.947	2.505	2.210	1.768	1.768	1.474	1.474	1.326	1.179
150	2.456	1.965	1.670	1.474	1.179	1.179	.9824	.9824	.8842	.7860
220	1.675	1.340	1.139	1.005	.8038	.8038	.6698	.6698	.6029	.5359
330	1.116	.8931	.7592	.6698	.5359	.5359	.4466	.4466	.4019	.3573
470	.7839	.6271	.5330	.4703	.3763	.3763	.3135	.3135	.2822	.2508
680	.5418	.4334	.3684	.3251	.2601	.2601	.2167	.2167	.1950	.1734
1000	.3684	.2947	.2505	.2210	.1768	.1768	.1474	.1474	.1326	.1179
1500	.2554	.2063	.1768	.1572	.1277	.1277	.1081	.1081	.9082	.0884
2200	.1809	.1474	.1273	.1139	.0938	.0938	.0804	.0804	.0737	.0670
3300	.1295	.1072	.0938	.0848	.0715	.0715	.0625	.0625	.0581	
4700	.1035	.0878	.0784	.0721	.0627	.0627	.0564	.0564		
6800	.0802	.0693	.0628	.0585	.0520	.0520	.0477			
10000	.0634	.0560	.0516	.0486	.0442	.0442				
15000	.0521	.0472	.0442	.0422	.0393	.0393				
22000	.0449	.0415	.0395							
33000	.0397									

LOW TEMPERATURE CHARACTERISTICS:

IMPEDANCE (Z) RATIO AT 120 Hz SHALL NOT EXCEED THESE FIGURES										
W. V.	6.3	10	16	25	35	40	50	63	80	100
Z- 25°C/Z+25°C	4	3	2	2	2	2	2	2	2	2
Z–40°C/Z+25°C	8	6	4	4	3	3	3	3	3	3

EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz 25°C										
μF \ W.V.	160	200	250	350	400	450	500			
0.47	313.5									
1	147.4	221.0	294.7	294.7	294.7	294.7	294.7			
1.5	98.24	147.4	196.5	196.5	196.5	196.5	196.5			
2.2	66.98	100.5	134.5	134.0	134.0	134.0	134.0			
3.3	44.66	66.98	89.31	89.31	89.31	89.31	89.31			
4.7	31.35	47.03	62.71	62.71	62.71	62.71	62.71			
6.8	21.67	32.51	43.34	43.34	43.34	43.34	43.34			
10	14.74	22.10	29.47	29.47	29.47	29.47	29.47			
15	9.824	14.74	19.65	19.65	19.65	19.65	19.65			
22	6.698	10.05	13.40	13.40	13.40	13.40	13.40			
33	4.466	6.698	8.931	8.931	8.931	8.931	8.931			
47	3.135	4.703	6.271	6.271	6.271	6.271	6.271			
68	2.167	3.251	4.334	4.334	4.334	4.334	4.334			
100	1.474	2.210	2.947	2.947	2.947	2.947				
150	.9824	1.474	1.965	1.965	1.965					
220	.6698	1.005	1.340	1.340						
330	.4466	.6698	.8931							
470	.3135	.4703								
680	.2167									

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES										
W.V.	160	200	250	350	400	450	500			
Z−25°C/Z+20°C	2	8	8	12	16	16				
Z−40°C/Z+20°C	3									

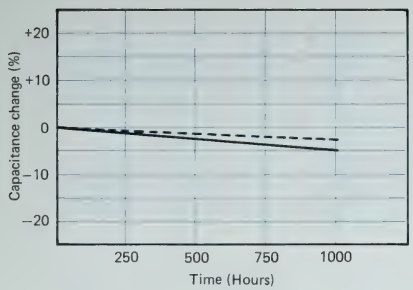
TYPICAL TEST DATA

— — — — 33μF 63V

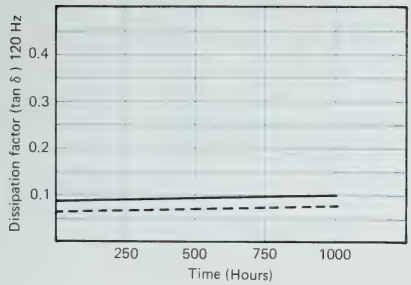
——— 680μF 40V

LIFE TEST

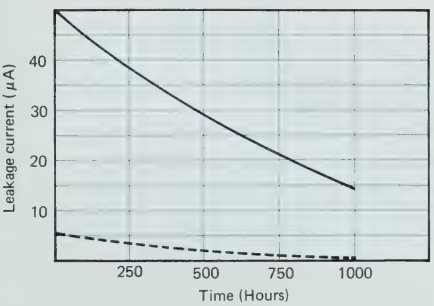
Capacitance change vs. time (at +85° C)



Dissipation factor vs. time (at +85° C)

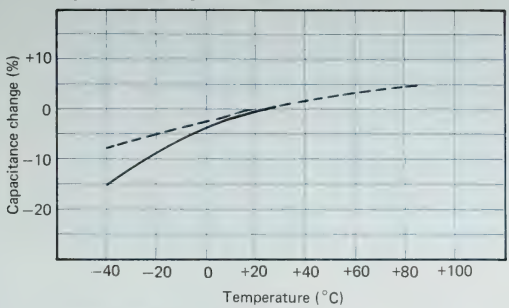


Leakage current vs. time (at + 85° C)

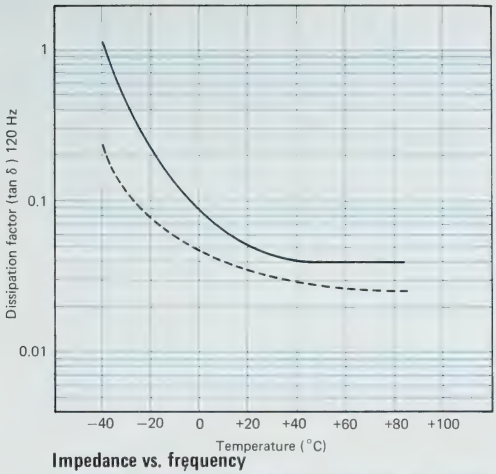


TEMPERATURE CHARACTERISTICS

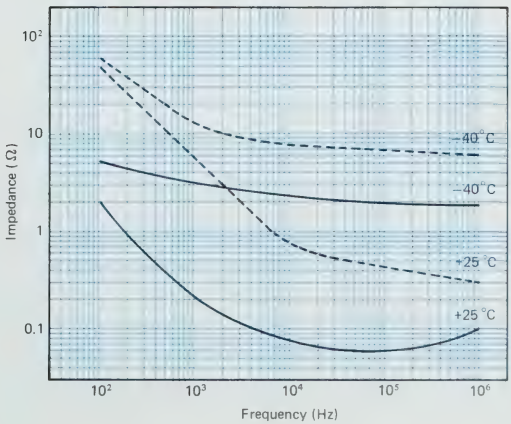
Capacitance change vs. temperature



Dissipation factor vs. temperature

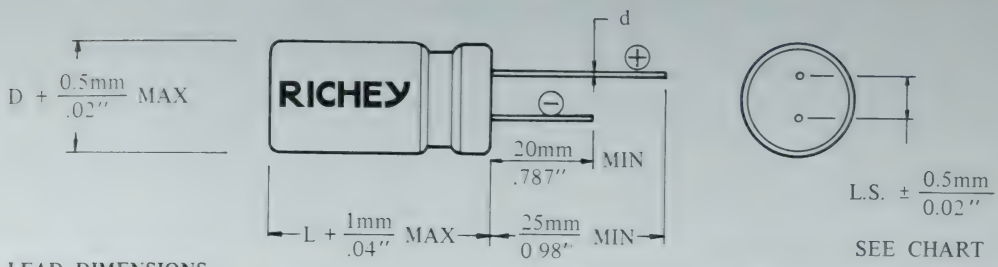


Impedance vs. frequency



RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE SM

RADIAL LEAD POLAR SUPER MINIATURE



SEE CHART

LEAD DIMENSIONS:

D	4	5	6.3
	.157	.197	.250
L.S.	1.5	2.0	2.5
	.06	.08	.10
d	0.45	0.45	0.45
	.018	.018	.018

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 50V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	0.1μF – 47μF
CAPACITANCE TOLERANCE	±20% (M) 120HZ 25°C
D.C. LEAKAGE CURRENT	0.01CV OR 3μA MINIMUM

DISSIPATION FACTOR (TANδ): AT 120HZ 25°C						
W. V.	6.3	10	16	25	35	50
TAN δ	0.25	0.20	0.17	0.15	0.13	0.10

LOW TEMPERATURE CHARACTERISTICS:

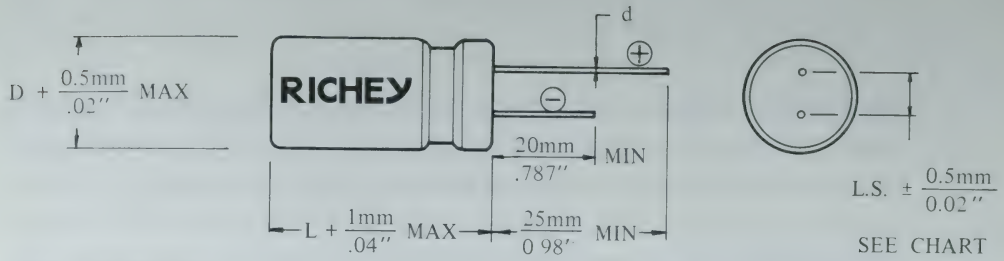
IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES						
W. V.	6.3	10	16	25	35	50
Z–25°C/Z+20°C	4	3	2	2	2	2
Z–40°C/Z+20°C	8	6	4	4	3	3

DIMENSIONS D X L									
W.V. / S.V. / μF	6.3 / 8	10 / 13	16 / 20	25 / 32	35 / 44	50 / 63			
0.1						4x7 157x.276			
0.22						4x7 157x.276			
0.33						4x7 157x.276			
0.47						4x7 157x.276			
1						4x7 157x.276			
2.2						4x7 157x.276			
3.3						4x7 157x.276			
4.7					4x7 157x.276	5x7 197x.276			
10			4x7 157x.276	5x7 197x.276	5x7 197x.276	6.3x7 250x.276			
22	4x7 157x.276	5x7 197x.276	5x7 197x.276	6.3x7 250x.276	6.3x7 250x.276				
33	5x7 197x.276	5x7 197x.276	6.3x7 250x.276	6.3x7 250x.276					
47	5x7 197x.276	6.3x7 250x.276	6.3x7 250x.276						
100									

PERMISSIBLE RIPPLE CURRENTS mA RMS MAX AT 120Hz 85°C EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz 25°C									
μF / W.V.	6.3	10	16	25	35	50			
0.1						1 1658.			
0.22						2 753.6			
0.33						2.5 502.4			
0.47						3 352.7			
1						5.5 165.8			
2.2						12.5 75.36			
3.3						16 50.24			
4.7					17 45.86	23 35.27			
10			17 28.18	27 24.87	27 21.55	39 16.58			
22	27 18.84	35 15.07	35 12.81	35 11.30	36 9.796				
33	38 12.56	43 10.05	54 8.541	57 7.536					
47	46 8.818	59 7.055	64 5.997						
100	101 4.143								

RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE LP

RADIAL LEAD POLAR LOW PROFILE



SEE CHART

LEAD DIMENSIONS:

D	10	13	16	18
	.394	.512	.630	.709
L.S.	5.0	5.0 6.5 7.5	7.5	7.5
	.197	.197 .256.295	.295	.295
d	0.6	0.6 0.8 0.6	0.8	0.8
	.024	.024 .031.024	.031	.031

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 100V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	33μF – 4700μF
CAPACITANCE TOLERANCE	± 20% (M) 120HZ 25°C
D.C. LEAKAGE CURRENT *AFTER 5 MINUTES*	0.02CV OR 3000μA MAXIMUM

DISSIPATION FACTOR (TANδ) AT 120HZ 25°C.									
W.V.	6.3	10	16	25	35	50	63	80	100
TAN δ	0.24	0.20	0.17	0.15	0.12	0.10	0.10	0.09	0.08
Tan δ values to be increased by 0.02 per 1000μF for capacitance values greater than 1000μF.									

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES									
W.V.	6.3	10	16	25	35	50	60	80	100
Z -25°C/Z+20°C	4	3	2	2	2	2	2	2	2
Z -40°C/Z+20°C	8	6	4	4	4	4	4	4	4

DIMENSIONS D X L

W.V. / S.V. / µF	6.3 / 8	10 / 13	16 / 20	25 / 32	35 / 44	50 / 63	63 / 80	80 / 100	100 / 125
33									10x13 .394x.512
47								10x13 .394x.512	10x16 .394x.630
68								10x16 .394x.630	13x15 .512x.590
100						10x13 .394x.512	10x16 .394x.630	13x15 .512x.590	16x16 .630x.630
150						10x16 .394x.630	13x15 .394x.590	16x16 .630x.630	16x20 .630x.787
220				10x13 .394x.512	10x16 .394x.630	13x15 .512x.590	16x16 .630x.630	16x20 .630x.787	16x25 .630x.984
330			10x13 .394x.512	10x16 .394x.630	13x15 .512x.590	16x16 .630x.630	16x20 .630x.787		
470		10x13 .394x.512	10x16* .394x.630	13x15 .512x.590	16x16 .630x.630	18x15 .709x.590			
680		13x12 .512x.472	13x15 .512x.590	16x16 .630x.630	16x20 .630x.787	18x25 .709x.984			
1000	10x16 .394x.630	13x15 .512x.590	13x15 .512x.590	16x16 .630x.630	16x20 .630x.787	18x25 .709x.984			
1500	16x16 .630x.630	16x16 .630x.630	16x20 .630x.787	16x25 .630x.984					
2200	16x16 .630x.630	13x26 .512x1.024	16x20 .630x.787	18x25 .709x.984					
3300	16x20 .630x.787	16x25 .630x.984							
4700	16x25 .630x.984								

* (470µF – 16V ALTERNATIVE SIZE 13 X 12)

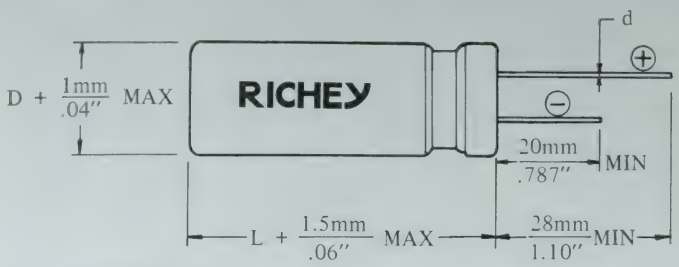
PERMISSIBLE RIPPLE CURRENTS mA RMS MAX AT 120Hz 85°C

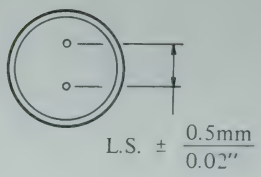
EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz 25°C

µF / W.V.	6.3	10	16	25	35	50	63	80	100
33									130 4.019
47								150 3.175	170 2.822
68								190 2.194	240 1.950
100						210 1.658	220 1.658	280 1.492	340 1.326
150						270 1.105	320 1.105	390 .9947	450 .8842
220				250 1.130	300 .9043	390 .7536	450 .7536	510 .6782	590 .6029
330			290 .8541	330 .7536	430 .6029	550 .5024	590 .5024		
470		320 .7055	370 .5997	460 .5291	590 .4233	700 .3527			
680		450 .4876	520 .4145	640 .3657	780 .2926	1000 .2438			
1000	450 .3979	590 .3316	630 .2818	780 .2487	940 .1989	1200 .1658			
1500	750 .2763	830 .2321	970 .1989	1120 .1768					
2200	910 .1959	1000 .1658	1170 .1432	1460 .1281					
3300	1210 .1407	1440 .1206							
4700	1570 .1129								

RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE LCL

RADIAL LEAD POLAR LOW D.C. LEAKAGE CURRENT





SEE CHART

LEAD DIMENSIONS:

D	5	6	8	10	13	16	18
	.197	.236	.315	.394	.512	.630	.709
L.S.	2.0	2.5	3.5	5	5.0 6.5 7.5	7.5	7.5
	.08	.098	.138	.197	.197 .256.295	.295	.295
d	0.5	0.5	0.5	0.6	0.6 0.8 0.6	0.8	0.8
	.020	.020	.020	.024	.024 .031.024	.031	.031

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 100V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	0.1μF – 4700μF
CAPACITANCE TOLERANCE	± 20% 120HZ 25°C
D.C. LEAKAGE CURRENT *AFTER 2 MINUTES*	0.002CV OR 0.4μA MINIMUM

DISSIPATION FACTOR: (TAN δ) AT 120HZ 25°C						
W.V	6.3	10	16	25	35	⩾50
TAN δ	0.17	0.15	0.12	0.12	0.10	0.08
Tan δ values to be increased by 0.02 per 1000μF for capacitance values greater than 1000μF.						

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES						
W.V.	6.3	10	16	25	35	⩾50
Z–25°C/Z+20°C	3	2	2	1.5	1.5	1.5
Z–40°C/Z+20°C	8	6	3	2	2	2

DIMENSIONS D X L

W.V. / S.V. / µF	6.3	10	16	25	35	50	63	80	100
	8	13	20	32	44	63	80	100	125
0.1	→	→	→	→	→	→	→	→	5x11 .197x.433
0.15	→	→	→	→	→	→	→	→	5x11 .197x.433
0.22	→	→	→	→	→	→	→	→	5x11 .197x.433
0.33	→	→	→	→	→	→	→	→	5x11 .197x.433
0.47	→	→	→	→	→	→	→	→	5x11 .197x.433
0.68	→	→	→	→	→	→	→	→	5x11 .197x.433
1	→	→	→	→	→	→	→	→	5x11 .197x.433
1.5	→	→	→	→	→	→	→	→	5x11 .197x.433
2.2	→	→	→	→	→	→	→	5x11 .197x.433	6x11 .236x.433
3.3	→	→	→	→	→	→	5x11 .197x.433	6x11 .236x.433	8x12 .315x.472
4.7	→	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472
6.8	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512
10	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630
15	→	→	5x11 .197x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787
22	→	5x11 .197x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x16 .394x.630	10x20 .394x.787
33	→	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	10x20 .394x.787	13x20 .512x.787
47	→	6x11 .236x.433	8x12 .315x.472	10x13 .394x.512	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x20 .512x.787
68	→	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	13x26 .512x1.024
100	→	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x25 .630x.984
150	→	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x25 .630x.984	16x31 .630x1.220
220	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	16x31 .630x1.220	16x38 .630x1.496
330	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	16x38 .630x1.496	16x38 .630x1.496	18x40 .709x1.575
470	10x20 .394x.787	13x20 .512x.787	13x20 .512x.787	16x25 .630x.984	16x25 .630x.984	16x38 .630x1.496	18x40 .709x1.575	18x40 .709x1.575	
680	13x20 .512x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x38 .630x1.496	18x40 .709x1.575	18x40 .709x1.575	18x40 .709x1.575	
1000	13x26 .512x1.024	13x26 .512x1.024	16x25 .630x.984	16x38 .630x1.496	18x40 .709x1.575	18x40 .709x1.575			
1500	16x25 .630x.984	16x25 .630x.984	16x31 .630x1.220	16x38 .630x1.496	18x40 .709x1.575				
2200	16x25 .630x.984	16x31 .630x1.220	18x40 .709x1.575	18x40 .709x1.575					
3300	16x38 .630x1.496	18x40 .709x1.575	18x40 .709x1.575						
4700	18x40 .709x1.575	18x40 .709x1.575							

PERMISSIBLE RIPPLE CURRENTS mA RMS MAXIMUM AT 120HZ & 85 °C EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz & 25 °C									
μF \ W.V.	6.3	10	16	25	35	50	63	80	100
0.1									4 1326.
0.15									5 884.2
0.22									6 602.9
0.33									8 401.9
0.47									9 282.2
0.68									11 195.0
1									14 132.6
1.5									17 88.42
2.2								21 60.29	23 60.29
3.3							26 40.19	29 40.19	35 40.19
4.7					23 35.27	34 28.22	34 28.22	42 28.22	42 28.22
6.8				33 29.26	37 24.38	42 19.50	50 19.50	50 19.50	60 19.50
10			32 19.89	45 19.89	45 16.58	61 13.26	61 13.26	73 13.26	78 13.26
15			33 13.26	55 13.26	67 11.05	75 8.842	89 8.842	96 8.842	106 8.842
22		33 11.30	48 9.043	81 9.043	81 7.536	108 6.029	117 6.029	117 6.029	128 6.029
33		63 7.536	65 6.029	100 6.029	118 5.024	143 4.019	157 4.019	157 4.019	185 4.019
47		75 5.291	104 4.233	141 4.233	141 3.527	171 2.822	188 2.822	221 2.822	221 2.822
68		110 3.657	126 2.926	170 2.926	184 2.438	226 1.950	265 1.950	291 1.950	291 1.950
100		133 2.487	181 1.989	223 1.989	245 1.658	322 1.326	353 1.326	395 1.326	395 1.326
150		194 1.658	239 1.326	301 1.326	353 1.105	433 .8842	484 .8842	484 .8842	529 .8842
220	216 1.281	253 1.130	319 .9043	427 .9043	469 .7536	586 .6029	641 .6029	641 .6029	692 .6029
330	286 .8541	342 .7536	459 .6029	574 .6029	642 .5024	785 .4019	848 .4019	848 .4019	928 .4019
470	376 .5997	479 .5291	548 .4233	766 .4233	766 .3527	1012 .2822	1108 .2822	1108 .2822	
680	531 .4145	576 .3657	723 .2926	922 .2926	1088 .2438	1332 .1950	1332 .1950	1332 .1950	
1000	680 .2818	767 .2487	980 .1989	1320 .1989	1445 .1658	1445 .1326			
1500	945 .1989	1020 .1768	1266 .1437	1541 .1437	1688 .1216				
2200	1118 .1432	1316 .1281	1750 .1055	1957 .1055					
3300	1548 .1055	1812 .0955	2013 .0804						
4700	1872 .0882	1982 .0811							

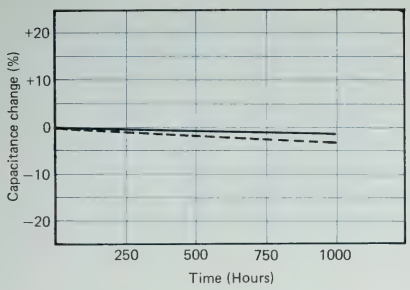
TYPICAL TEST DATA

1μF 63V

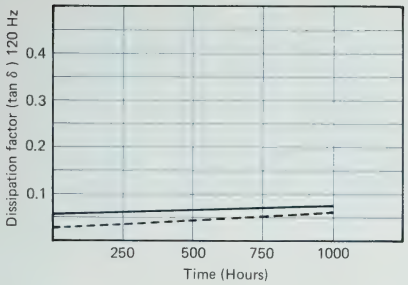
33μF 25V

LIFE TEST

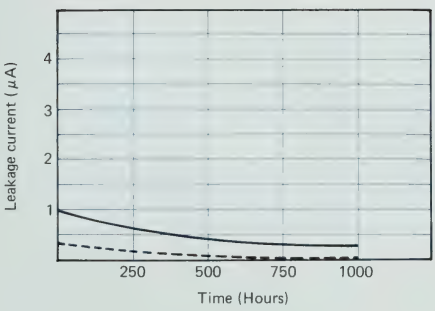
Capacitance change vs. time (at +85°C)



Dissipation factor vs. time (at +85°C)

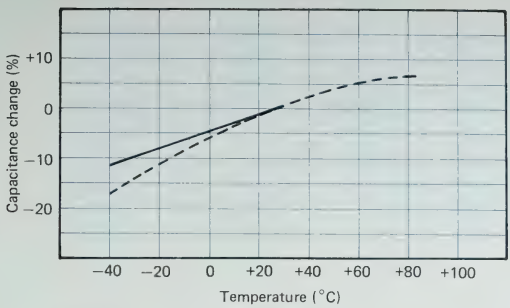


Leakage current vs. time (at + 85°C)

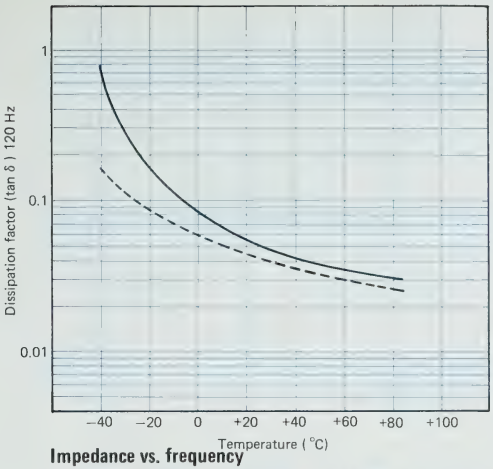


TEMPERATURE CHARACTERISTICS

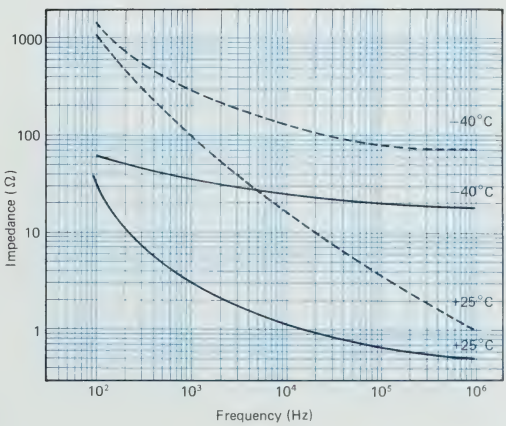
Capacitance change vs. temperature



Dissipation factor vs. temperature

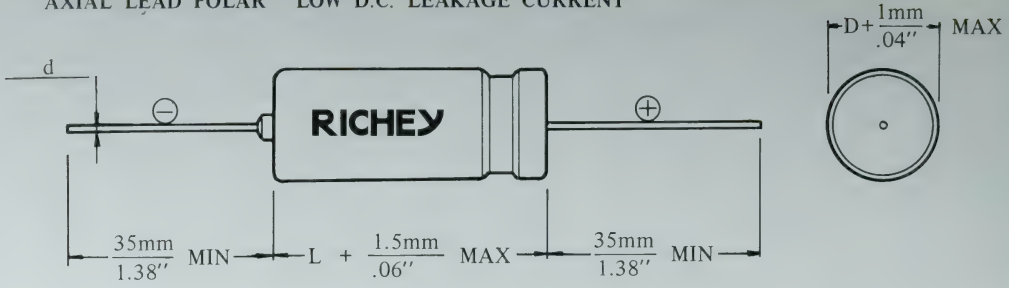


Impedance vs. frequency



RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE MDIL

AXIAL LEAD POLAR LOW D.C. LEAKAGE CURRENT



LEAD DIMENSIONS:

D	5	6	8	10	13	16	18	22	25
	.197	.236	.315	.394	.512	.630	.709	.866	.984
d	0.6	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.8
	.024	.024	.024	.024	.031	.031	.031	.031	.031

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 100V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	0.1μF – 10,000μF
CAPACITANCE TOLERANCE	± 20% 120HZ 25°C
D.C. LEAKAGE CURRENT *AFTER 2 MINUTES*	0.002CV OR 1μA MINIMUM

DISSIPATION FACTOR (TAN δ) AT 120 HZ 25°C						
W. V.	6.3	10	16	25	35	⩾50
TAN δ	0.17	0.15	0.12	0.12	0.10	0.08
TAN δ FOR 5MM CASE			0.17	0.15	0.13	0.10
Tan δ values to be increased by 0.02 per 1000μF for capacitance values greater than 1000μF.						

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES						
W.V.	6.3	10	16	25	35	⩾50
Z -25°C/Z+20°C	3	2	2	1.5	1.5	1.5
Z -40°C/Z+20°C	8	6	3	2	2	2

DIMENSIONS D X L									
W.V. / S.V. / µF	6.3	10	16	25	35	50	63	80	100
	8	13	20	32	44	63	80	100	125
0.1	→	→	→	→	→	→	→	→	5 x 12 .197 x .472
0.15	→	→	→	→	→	→	→	→	5 x 12 .197 x .472
0.22	→	→	→	→	→	→	→	→	5 x 12 .197 x .472
0.33	→	→	→	→	→	→	→	→	5 x 12 .197 x .472
0.47	→	→	→	→	→	→	→	→	5 x 12 .197 x .472
0.68	→	→	→	→	→	→	→	→	5 x 12 .197 x .472
1	→	→	→	→	→	→	→	→	5 x 12 .197 x .472
1.5	→	→	→	→	→	→	→	→	5 x 12 .197 x .472
2.2	→	→	→	→	→	→	5 x 12 .197 x .472	6x12 .236x.472	6x16 .236x.630
3.3	→	→	→	→	→	5 x 12 .197 x .472	6x12 .236x.472	6x12 .236x.472	8x16 .315x.630
4.7	→	→	→	→	5 x 12 .197 x .472	6x12 .236x.472	6x12 .236x.472	6x16 .236x.630	8x16 .315x.630
6.8	→	→	→	5 x 12 .197 x .472	6x12 .236x.472	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630
10	→	→	5 x 12 .197 x .472	6x12 .236x.472	6x12 .236x.472	8x16 .315x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787
15	→	5 x 12 .197 x .472	6x12 .236x.472	6x12 .236x.472	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827
22	→	6x12 .236x.472	6x12 .236x.472	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945
33	→	6x12 .236x.472	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181
47	→	6x13 .236x.512	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	13x24 .512x.945	13x24 .512x.945
68	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x32 .512x1.260	13x32 .512x1.260
100	8x16 .315x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	13x36 .512x1.417	16x32 .630x1.260
150	8x16 .315x.630	8x20 .315x.787	8x20 .315x.787	10x21 .394x.827	10x30 .394x1.181	13x24 .512x.945	13x32 .512x1.260	16x32 .630x1.260	16x32 .630x1.260
220	8x20 .315x.787	10x21 .394x.827	10x21 .394x.827	10x30 .394x1.181	13x32 .512x1.260	16x32 .630x1.260	16x32 .630x1.260	16x32 .630x1.260	16x40 .630x1.575
330	10x21 .394x.827	10x21 .394x.827	10x30 .394x1.181	13x32 .512x1.260	13x36 .512x1.417	16x32 .630x1.260	16x40 .630x1.575	16x40 .630x1.575	18x40 .709x1.575
470	10x21 .394x.827	10x30 .394x1.181	10x30 .394x1.181	13x32 .512x1.260	16x32 .630x1.260	16x40 .630x1.575	18x40 .709x1.575	18x40 .709x1.575	
680	10x30 .394x1.181	10x30 .394x1.181	13x32 .512x1.260	16x32 .630x1.260	16x40 .630x1.575	18x40 .709x1.575	18x40 .709x1.575	18x40 .709x1.575	
1000	13x24 .512x.945	13x32 .512x1.260	16x32 .630x1.260	16x40 .630x1.575	18x40 .709x1.575	18x40 .709x1.575	22x51 .866x2.008		
1500	13x32 .512x1.260	16x32 .630x1.260	16x32 .630x1.260	16x40 .630x1.575	18x40 .709x1.575	22x51 .866x2.008	25x59 .984x2.323		
2200	16x32 .630x1.260	16x32 .630x1.260	18x40 .709x1.575	18x40 .709x1.575	22x51 .866x2.008	25x59 .984x2.323			
3300	16x40 .630x1.575	18x40 .709x1.575	18x40 .709x1.575	22x40 .866x1.575	25x51 .984x2.008				
4700	18x40 .709x1.575	18x40 .709x1.575	22x40 .866x1.575	22x51 .866x2.008	25x59 .866x2.323				
6800	22x40 .866x1.575	22x40 .866x1.575	22x51 .866x2.008	25x59 .984x2.323					
10000	22x51 .866x2.008	22x51 .866x2.008	25x51 .984x2.008						

PERMISSIBLE RIPPLE CURRENTS mA RMS MAXIMUM AT 120HZ & 85°C EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120HZ & 25°C									
μF \ W.V.	6.3	10	16	25	35	50	63	80	100
0.1								→	4 *1326.*
0.15								→	5 *884.2*
0.22								→	6 *602.9*
0.33								→	7 *401.9*
0.47								→	9 *282.2*
0.68								→	11 *195.0*
1								→	13 *132.6*
1.5							→	16	17 *88.42*
2.2						→	22 *60.29*	25 *60.29*	27 *60.29*
3.3					→	27 *40.19*	30 *40.19*	30 *40.19*	39 *40.19*
4.7				→	29 *35.27*	36 *28.22*	36 *28.22*	40 *28.22*	47 *28.22*
6.8			→	35 *29.26*	39 *24.38*	48 *19.50*	48 *19.50*	56 *19.50*	56 *19.50*
10		→	32 *19.89*	47 *19.89*	47 *16.58*	69 *13.26*	69 *13.26*	69 *13.26*	75 *13.26*
15	→	33 *16.58*	51 *13.26*	56 *13.26*	63 *11.05*	84 *8.842*	84 *8.842*	92 *8.843*	107 *8.842*
22	→	48 *11.30*	48 *9.043*	70 *9.043*	91 *7.536*	102 *6.029*	111 *6.029*	130 *6.029*	137 *6.029*
33	→	65 *7.536*	83 *6.029*	94 *6.029*	111 *5.024*	137 *4.019*	159 *4.019*	168 *4.019*	185 *4.019*
47	→	71 *5.291*	117 *4.233*	133 *4.233*	146 *3.527*	190 *2.822*	201 *2.822*	237 *2.822*	237 *2.822*
68	96 *4.145*	123 *3.657*	140 *2.976*	176 *2.926*	204 *2.438*	241 *1.950*	267 *1.950*	317 *1.950*	317 *1.950*
100	137 *2.818*	149 *2.487*	170 *1.989*	213 *1.989*	262 *1.658*	324 *1.326*	345 *1.326*	406 *1.326*	435 *1.326*
150	168 *1.879*	200 *1.658*	229 *1.326*	304 *1.326*	355 *1.105*	423 *.8842*	471 *.8842*	533 *.8842*	533 *.8842*
220	223 *1.281*	282 *1.130*	323 *.9043*	430 *.9043*	510 *.7536*	645 *.6029*	645 *.6029*	645 *.6029*	707 *.6029*
330	319 *.8541*	345 *.7536*	462 *.6029*	426 *.6029*	661 *.5024*	790 *.4019*	866 *.4019*	866 *.4019*	928 *.4019*
470	380 *.5997*	482 *.5291*	551 *.4233*	746 *.4233*	844 *.3527*	1033 *.2822*	1108 *.2822*	1108 *.2822*	
680	534 *.4145*	580 *.3657*	787 *.2926*	1015 *.2926*	1112 *.2438*	1332 *.1950*	1332 *.1950*	1332 *.1950*	
1000	691 *.2818*	835 *.2487*	1080 *.1989*	1348 *.1989*	1445 *.1658*	1445 *.1326*	1797 *.1326*		
1500	920 *.1989*	1124 *.1768*	1274 *.1437*	1651 *.1437*	1688 *.1216*	2099 *.0995*	2403 *.0995*		
2200	1231 *.1432*	1325 *.1281*	1750 *.1055*	1957 *.1055*	2433 *.0904*	2786 *.0754*			
3300	1581 *.1055*	1812 *.0955*	2013 *.0804*	2503 *.0804*	2977 *.0703*				
4700	1872 *.0882*	1982 *.0811*	2439 *.0705*	2904 *.0705*	3325 *.0635*				
6800	2376 *.0707*	2496 *.0658*	2964 *.0585*	3618 *.0585*					
10000	2916 *.0580*	3038 *.0547*	3483 *.0497*						

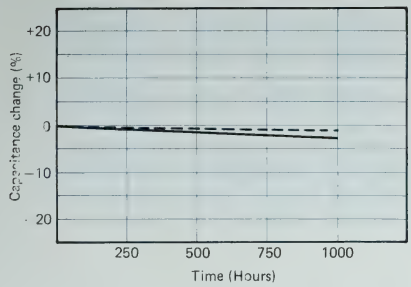
TYPICAL TEST DATA

— — — — 1μF 63V

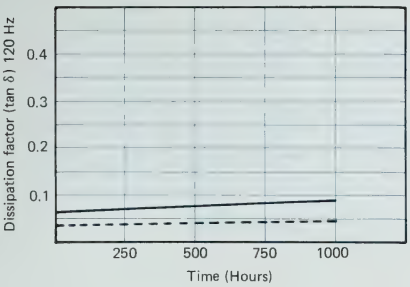
——— 33μF 35V

LIFE TEST

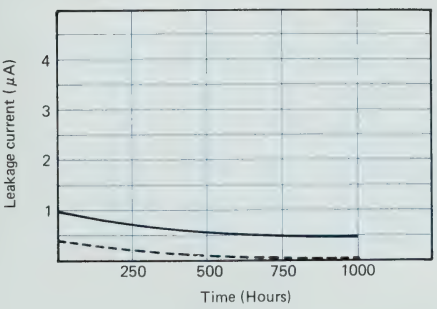
Capacitance change vs. time (at +85° C)



Dissipation factor vs. time (at +85 °C)

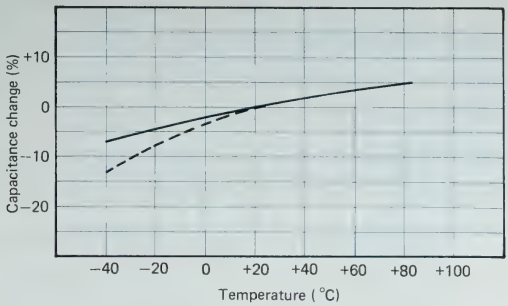


Leakage current vs. time (at + 85° C)

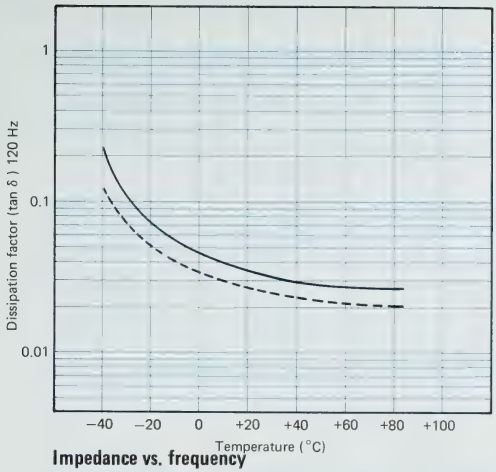


TEMPERATURE CHARACTERISTICS

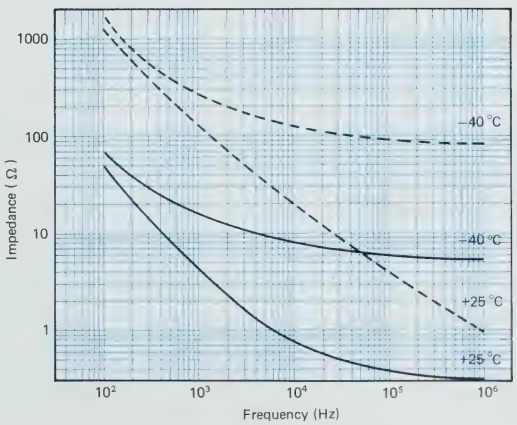
Capacitance change vs. temperature



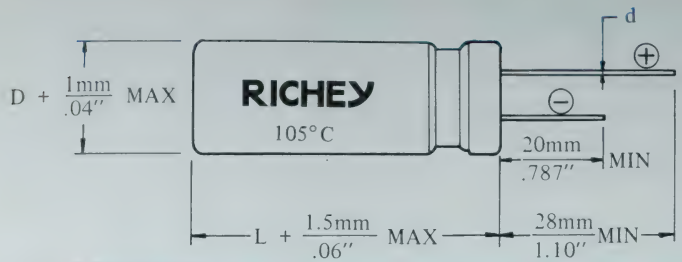
Dissipation factor vs. temperature

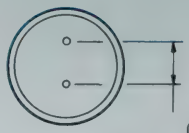


Impedance vs. frequency



RADIAL LEAD POLAR 105°C





SEE CHART

LEAD DIMENSIONS:

D	5	6	8	10	13	16	18
	.197	.236	.315	.394	.512	.630	.709
L.S.	2.0	2.5	3.5	5.0	5.0	7.5	7.5
	.08	.098	.138	.197	.197	.295	.295
d	0.5	0.5	0.5	0.6	0.6	0.8	0.8
	.020	.020	.020	.024	.024	.031	.031

SPECIFICATIONS:

Voltage Range	6.3V – 100V
Operating Temperature	–40°C +105°C
Capacitance Range	0.1μF – 10,000μF
Capacitance Tolerance	± 20% (M) 120HZ 25°C
D.C. Leakage Current	0.03 CV or 3μA *minimum after 1 minute*

Dissipation Factor (Tan δ) at 120HZ 25°C.										
W. V.	6.3	10	16	25	35	40	50	63	80	100
TAN δ	0.25	0.20	0.17	0.15	0.12	0.10	0.10	0.09	0.09	0.08
Tanδ values to be increased by 0.02 per 1000μF for capacitance values greater than 1000μF.										

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES										
W. V.	6.3	10	16	25	35	40	50	63	80	100
Z –25°C/ Z+20°C	3	2	2	2	2	2	2	2	2	2
Z –40°C/ Z+20°C	6	5	3	3	3	3	3	3	3	3

LIFE TEST After application of rated voltage at 105°C for 1000 hours, the following limits shall apply when the capacitor has been stabilized at 25°C.

Capacitance Change : ± 20% max of initial value.
Dissipation Factor : Less than 200% of the specified value.
DC Leakage Current : Not greater than the specified value.

SHELF TEST After storage at 105°C for 500 hrs without voltage applied, the following limits shall apply when the capacitor has been stabilized at 25°C.

Capacitance Change : ± 10% max of initial value.
Dissipation Factor : Less than 115% of the specified value.
DC Leakage Current : Less than 200% of the specified value.

DIMENSIONS D X L									
W.V. / S.V. / μF	6.3	10	16	25	35	50	63	80	100
	8	13	20	32	44	63	80	100	125
0.1	→	→	→	→	→	→	→	→	5x11 .197x.433
0.15	→	→	→	→	→	→	→	→	5x11 .197x.433
0.22	→	→	→	→	→	→	→	→	5x11 .197x.433
0.33	→	→	→	→	→	→	→	→	5x11 .197x.433
0.47	→	→	→	→	→	→	→	→	5x11 .197x.433
0.68	→	→	→	→	→	→	→	→	5x11 .197x.433
1	→	→	→	→	→	→	→	→	5x11 .197x.433
1.5	→	→	→	→	→	→	→	→	5x11 .197x.433
2.2	→	→	→	→	→	→	→	→	5x11 .197x.433
3.3	→	→	→	→	→	→	→	→	5x11 .197x.433
4.7	→	→	→	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433
6.8	→	→	→	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433
10	→	→	→	→	→	5x11 .197x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472
15	→	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472
22	→	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	10x13 .394x.512	10x13 .394x.512
33	→	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472	10x16 .394x.630	10x16 .394x.630
47	→	5x11 .197x.433	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787
68	→	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787
100	6x11 .236x.433	6x11 .236x.433	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x20 .512x.787
150	8x12 .315x.472	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x20 .512x.787	13x26 .512x1.024
220	8x12 .315x.472	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984
330	10x13 .394x.512	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x20 .512x.787	13x26 .512x1.024	16x31 .630x1.220	16x31 .630x1.220
470	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x25 .630x.984	16x36 .630x1.417	18x34 .709x1.339
680	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x25 .630x.984	16x31 .630x1.220	18x40 .709x1.575	
1000	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x25 .630x.984	16x31 .630x1.220	18x34 .709x1.339		
1500	13x26 .512x1.024	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	16x36 .630x1.417	18x40 .709x1.575			
2200	13x26 .512x1.024	16x25 .630x.984	16x25 .630x.984	16x36 .630x1.417	18x34 .709x1.339				
3300	16x25 .630x.984	16x31 .630x1.220	16x36 .630x1.417	18x40 .709x1.575					
4700	16x31 .630x1.220	16x36 .630x1.417	18x34 .709x1.339						
6800	18x34 .709x1.339	18x40 .709x1.575							
10000	18x40 .709x1.575								

PERMISSIBLE RIPPLE CURRENTS mA RMS MAXIMUM AT 120HZ & 105°C EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz & 25°C									
μF \ W.V.	6.3	10	16	25	35	50	63	80	100
0.1									4 1326
0.15									5 884.2
0.22									6 602.9
0.33									7.5 401.9
0.47									8.0 282.2
0.68									10 195.0
1									12 132.6
1.5									15 88.42
2.2									18 60.29
3.3									22 40.19
4.7						25	25 31.75	28 31.75	30 28.22
6.8						30	30 21.94	34 21.94	36 19.50
10						35 16.58	41 14.92	51 14.92	54 13.26
15					39 13.26	48 11.05	50 9.947	62 9.947	66 8.842
22				42 11.30	53 9.043	58 7.536	75 6.782	90 6.782	94 6.029
33			49 8.541	58 7.536	64 6.029	87 5.024	92 4.521	118 4.521	125 4.019
47		53 7.055	65 5.997	69 5.291	95 4.233	104 3.527	130 3.175	141 3.175	178 2.822
68		72 4.876	78 4.145	102 3.657	114 2.926	148 2.438	169 2.194	202 2.194	230 1.950
100	78 4.145	87 3.316	115 2.818	124 2.487	164 1.989	194 1.658	245 1.492	263 1.492	278 1.326
150	117 2.763	145 2.210	143 1.879	180 1.658	217 1.326	285 1.105	322 .9947	321 .9947	383 .8842
220	143 1.884	159 1.507	205 1.281	235 1.130	315 .9043	369 .7536	389 .6782	422 .6782	511 .6029
330	207 1.256	231 1.005	271 .8541	345 7536	413 .6029	452 .5024	520 .4521	586 .4521	681 .4019
470	247 .8818	298 .7055	386 5997	441 .5291	538 .4233	668 .3527	705 .3175	892 .3175	905 .2822
680	320 .6095	429 .4876	498 .4145	578 .3657	733 .2926	804 .2438	922 .2194	1096 .2194	
1000	464 .4145	556 .3316	458 .2818	796 .2487	890 .1989	1062 .1658	1393 .1492		
1500	653 .2874	726 .2321	890 .1989	1024 .1768	1180 .1437	1470 .1216			
2200	774 .2055	977 .1658	1050 .1432	1252 .1281	1476 .1055				
3300	1039 .1457	1264 .1206	1375 .1055	1656 .0955					
4700	1262 .1164	1423 .0988	1611 .0882						
6800	1602 .0902	1837 .0780							
10000	1925 .0713								

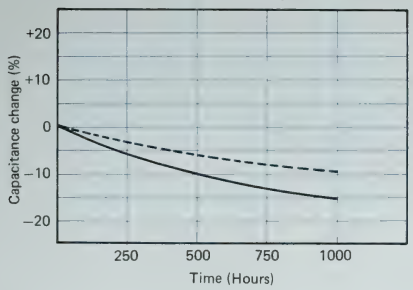
TYPICAL TEST DATA

— — — — 1μF 100V

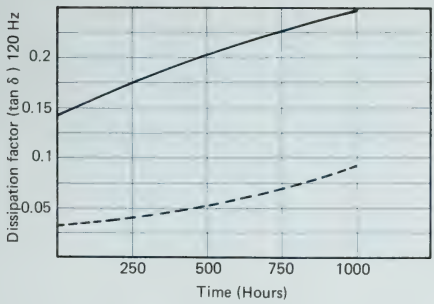
———— 2200μF 16V

LIFE TEST

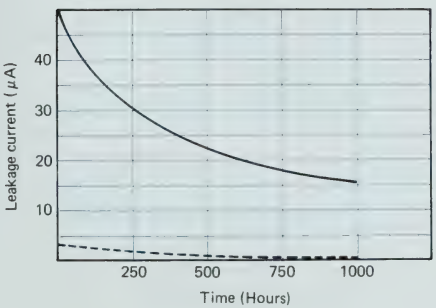
Capacitance change vs. time (at +105°C)



Dissipation factor vs. time (at +105°C)

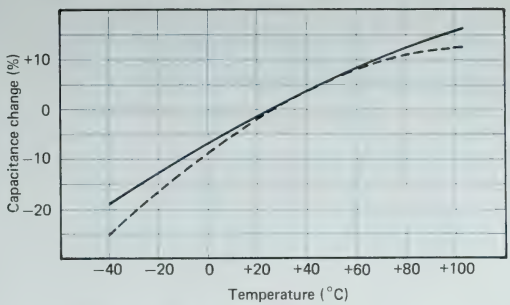


Leakage current vs. time (at +105° C)

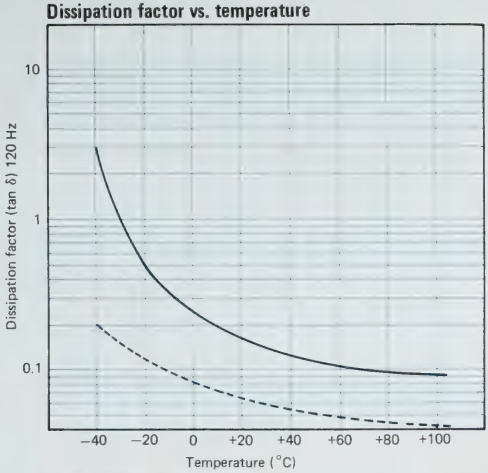


TEMPERATURE CHARACTERISTICS

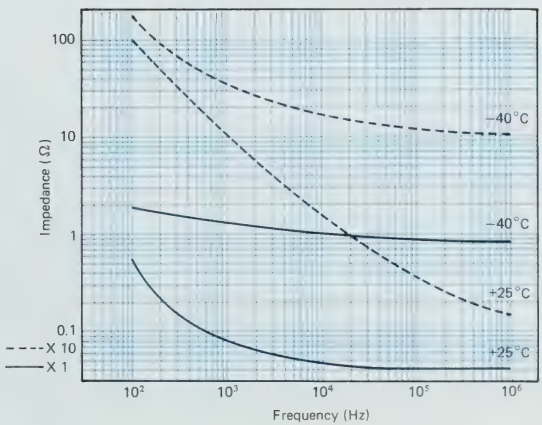
Capacitance change vs. temperature



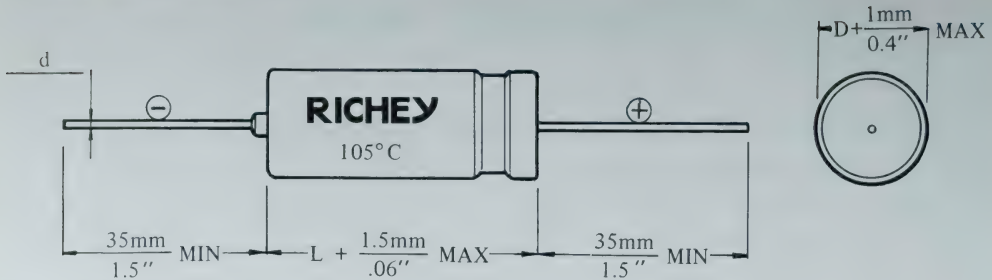
Dissipation factor vs. temperature



Impedance vs. frequency



AXIAL LEAD POLAR 105°C



LEAD DIMENSIONS:

D	5	6	8	10	13	16	18	22	25
	.197	.236	.315	.394	.512	.630	.709	.866	.984
d	0.6	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.8
	.024	.024	.024	.024	.031	.031	.031	.031	.031

SPECIFICATIONS:

Voltage Range	6.3V – 100V
Operating Temperature	–40°C +105°C
Capacitance Range	0.1μF – 10,000μF
Capacitance Tolerance	± 20% (M) 120HZ 25°C
D.C. Leakage Current	0.03 CV or 3μA *minimum after 1 minute*

Dissipation Factor (Tan δ) at 120HZ 25°C.										
W. V.	6.3	10	16	25	35	40	50	63	80	100
TAN δ	0.25	0.20	0.17	0.15	0.12	0.12	0.10	0.10	0.09	0.08
Tanδ values to be increased by 0.02 per 1000μF for capacitance values greater than 1000μF.										

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES										
W. V.	6.3	10	16	25	35	40	50	63	80	100
Z –25°C/ Z+20°C	3	2	2	2	2	2	2	2	2	2
Z –40°C/ Z+20°C	6	5	3	3	3	3	3	3	3	3

LIFE TEST After application of rated voltage at 105°C for 1000 hours, the following limits shall apply when the capacitor has been stabilized at 25°C.

Capacitance Change : ± 20% max of initial value.
Dissipation Factor : Less than 200% of the specified value.
DC Leakage Current : Not greater than the specified value.

SHELF TEST After storage at 105°C for 500 hours without voltage applied, the following limits shall apply when the capacitor has been stabilized at 25°C.

Capacitance Change : ± 10% max of initial value.
Dissipation Factor : Less than 115% of the specified value.
DC Leakage Current : Less than 200% of the specified value.

DIMENSIONS D X L									
W.V. / S.V. / µF	6.3	10	16	25	35	50	63	80	100
	8	13	20	32	44	63	80	100	125
0.47									5x13 .197x.512
1									5x13 .197x.512
1.5									5x13 .197x.512
2.2									5x13 .197x.512
3.3								5x13 .197x.512	6x13 .236x.512
4.7						5x13 .197x.512	6x13 .236x.512	6x13 .236x.512	6x13 .236x.512
6.8						5x13 .197x.512	6x13 .236x.512	6x13 .236x.512	6x16 .236x.630
10						5x13 .197x.512	6x13 .236x.512	6x16 .236x.630	8x16 .315x.630
15					6x13 .236x.512	6x16 .236x.630	6x16 .236x.630	8x16 .315x.630	8x20 .315x.787
22			5x13 .197x.512	6x13 .236x.512	6x13 .236x.512	6x16 .236x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827
33			5x13 .197x.512	6x13 .236x.512	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	10x21 .394x.827	10x24 .394x.945
47		5x13 .197x.512	6x13 .236x.512	6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x24 .394x.945	10x24 .394x.945
68		6x13 .236x.512	6x16 .236x.630	8x16 .315x.630	8x20 .315x.787	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x24 .394x.945
100		6x16 .236x.630	8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945
150		8x16 .315x.630	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	13x32 .512x1.260
220		8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	16x32 .630x1.260	13x40 .512x1.575
330	8x16 .315x.630	8x20 .315x.787	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	13x32 .512x1.260	16x32 .630x1.260	16x32 .630x1.260
470	10x21 .394x.827	10x21 .394x.827	10x24 .394x.945	13x24 .512x.945	13x32 .512x1.260	13x32 .512x1.260	13x40 .512x1.575	16x40 .630x1.575	18x40 .709x1.575
680	10x21 .394x.827	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	13x36 .512x1.417	16x32 .630x1.260	16x40 .630x1.575	18x40 .709x1.575	22x40 .866x1.575
1000	10x24 .394x.945	10x30 .394x1.181	13x24 .512x.945	13x32 .512x1.260	13x40 .512x1.575	16x32 .630x1.260	18x40 .709x1.575	22x40 .866x1.575	22x51 .866x2.008
1500	13x24 .512x.945	13x24 .512x.945	16x32 .630x1.260	16x32 .630x1.260	16x40 .630x1.575	18x40 .709x1.575	22x40 .866x1.575	25x40 .984x1.575	
2200	13x24 .512x.945	13x32 .512x1.260	16x32 .630x1.260	16x40 .630x1.575	18x40 .709x1.575	22x40 .866x1.575	25x51 .984x2.008	25x59 .984x2.323	
3300	13x36 .512x1.417	13x40 .512x1.575	16x40 .630x1.575	18x40 .709x1.575	22x40 .866x1.575	22x59 .866x2.323	25x51 .984x2.008		
4700	16x32 .630x1.260	16x32 .630x1.260	18x40 .709x1.575	22x51 .866x2.008	25x51 .984x2.008	25x59 .984x2.323			
6800	18x40 .709x1.575	18x40 .709x1.575	22x51 .866x2.008	25x51 .984x2.008					
10000	22x40 .866x1.575	22x40 .866x1.575	22x51 .866x2.008	25x59 .984x2.323					

PERMISSIBLE RIPPLE CURRENTS mA RMS MAXIMUM AT 120HZ & 105°C EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz & 25°C									
μF \ W.V.	6.3	10	16	25	35	50	63	80	100
0.47								→	9 282.2
1								→	13 132.6
1.5								→	16 88.42
2.2								→	19 60.29
3.3					→	21 60.29		22 45.21	26 40.19
4.7					→	25 35.27	28 35.27	29 31.75	31 28.22
6.8					→	30 24.38	33 24.38	35 21.94	42 19.50
10					→	36 16.58	40 16.58	48 14.92	60 13.26
15				→	45 13.26	55 11.05	55 11.05	69 9.947	80 8.842
22		→	41 12.81	49 11.30	54 9.043	67 7.536	80 7.536	92 6.782	113 6.029
33		→	50 8.541	59 7.536	75 6.029	96 5.024	97 5.024	131 4.521	147 4.019
47	→	55 7.055	67 5.997	80 5.291	106 4.233	116 3.527	127 3.527	165 3.175	175 2.822
68	→	74 4.876	91 4 145	114 3.657	140 2.926	153 2.438	178 2.438	199 2.194	211 1.950
100	→	101 3.316	130 2.818	138 2.487	170 1.989	216 1.658	228 1.658	265 1.492	302 1.326
150	→	147 2.210	159 1.879	186 1.658	272 1.326	280 1.105	307 1.105	315 .9947	411 .8842
220	→	178 1.507	212 1.281	262 1.130	309 .9043	372 .7536	396 .7536	561 .6782	547 .6029
330	196 1.256	239 1.005	301 .8541	339 .7536	416 .6029	485 .5024	545 .5024	650 .4521	689 .4019
470	297 .8818	332 .7055	380 .5997	473 .5291	594 .4233	650 .3527	511 .3527	850 .3175	1045 .2822
680	357 .6095	422 .4876	502 .4145	569 .3657	750 .2926	885 .2438	969 .2438	1096 .2194	1310 .1950
1000	457 .4145	561 .3316	648 .2818	774 .2487	952 .1989	1076 .1658	1263 .1658	1494 .1492	1749 .1326
1500	642 .2874	714 .2321	980 .1989	1039 .1768	1262 .1437	1469 .1216	1657 .1216	1887 .1105	
2200	762 .2035	951 .1658	1156 .1432	1338 .1281	1576 .1055	1929 .0904	2294 .0904	2535 .0829	
3300	1063 .1457	1226 .1206	1470 .1055	1656 .0955	2033 .0804	2544 .0703	2583 .0705		
4200	1278 .1164	1389 .0988	1720 .0882	2242 .0811	2583 .0705	2887 .0635			
6800	1710 .0902	1837 .0780	2394 .0707	2652 .0658					
10000	2172 .0713	2306 .0630	2672 .0580	3114 .0547					

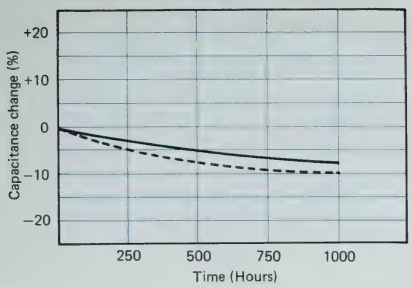
TYPICAL TEST DATA

— — — — 220 μF 35V

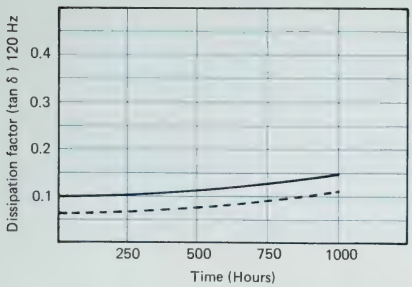
——— 2,200 μF 25V

LIFE TEST

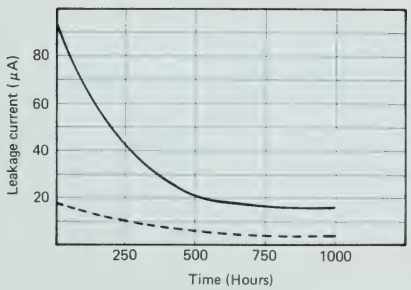
Capacitance change vs. time (at +105 °C)



Dissipation factor vs. time (at +105 °C)

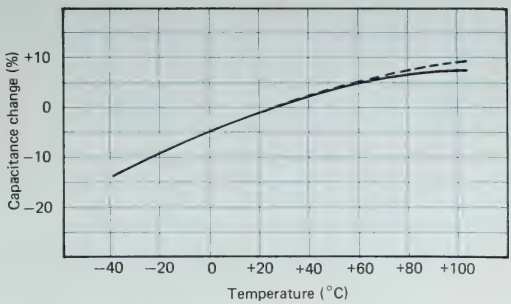


Leakage current vs. time (at +105 °C)

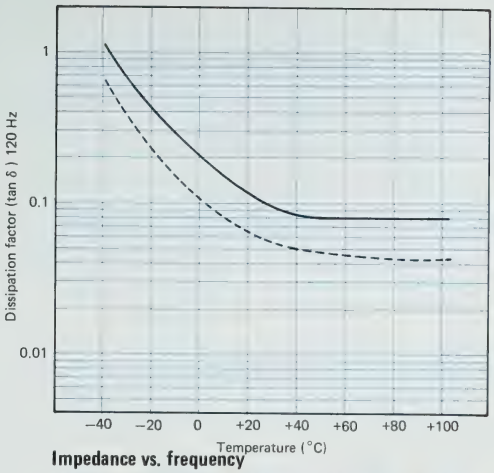


TEMPERATURE CHARACTERISTICS

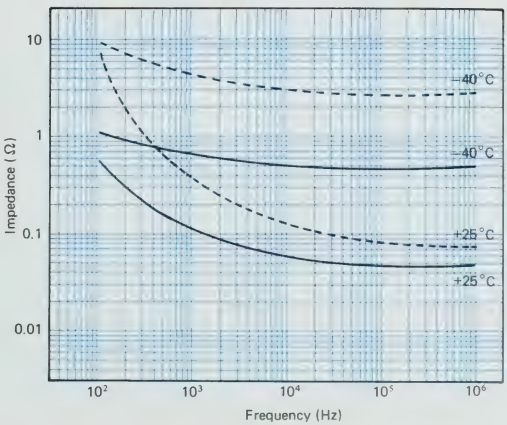
Capacitance change vs. temperature



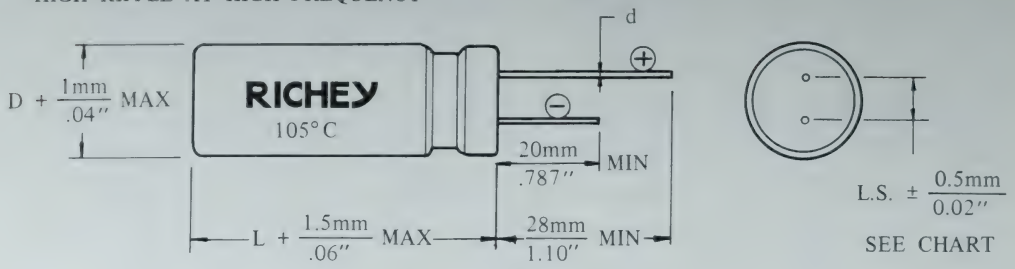
Dissipation factor vs. temperature



Impedance vs. frequency



RADIAL LEAD POLAR 105°C LOW IMPEDANCE AND ESR HIGH RIPPLE AT HIGH FREQUENCY



LEAD DIMENSIONS:

D	5	6	8	10	13
	.197	.236	.315	.394	.512
L.S.	2.0	2.5	3.5	5.0	5.0
	.08	.098	.138	.197	.197
d	0.5	0.5	0.5	0.6	0.6
	.020	.020	.020	.024	.024

SPECIFICATIONS:

Voltage Range	6.3V – 100V
Operating Temperature	−40°C +105°C
Capacitance Range	2.2μF −1000μF
Capacitance Tolerance	± 20% (M) 120HZ 25°C
D.C. Leakage Current *after 5 minutes*	0.002 CV or 2μA minimum

LIFE TEST After application of rated voltage at 105°C for 1000 hours, the following limits shall apply when the capacitor has been stabilized at 25°C.

Capacitance Change : ± 15% max of initial value.
ESR at 120HZ and 1KHZ : Less than 200% of the specified value.
DC Leakage Current : Not greater than the specified value.

SHELF TEST After storage at 105°C for 500 hrs without voltage applied, the following limits shall apply when the capacitor has been stabilized at 25°C.

Capacitance Change : ± 10% max of initial value.
ESR at 120HZ and 1KHZ : Less than 115% of the specified value.
DC Leakage Current : Less than 200% of the specified value.

RIPPLE CURRENT When the capacitors are operated at a temperature and frequency other than 85°C and 100KHZ, use the following multiplying factors to obtain the permissible ripple current.

°C \ FREQ. HZ	120	1K	10K	100K
105	0.33	0.45	0.5	0.5
85	0.67	0.9	1	1
75	0.93	1.27	1.4	1.4
50	1.2	1.6	1.8	1.8

DIMENSIONS D X L

W.V. / S.V. / μF	6.3 / 8	10 / 13	16 / 20	25 / 32	35 / 44	50 / 63	63 / 80	100 / 125
2.2	→	→	→	→	→	→	→	**8x12** *.315x.472*
3.3	→	→	→	→	→	→	**8x12** *.315x.472*	**10x13** *.394x.512*
3.7	→	→	→	→	→	→	**8x12** *.315x.472*	**10x16** *.394x.630*
6.8	→	→	→	→	→	→	**8x12** *.315x.472*	**10x16** *.394x.630*
10	→	→	→	→	→	**8x12** *.315x.472*	**10x13** *.394x.512*	**10x20** *.394x.787*
15	→	→	→	→	**8x12** *.315x.472*	**10x13** *.394x.512*	**10x16** *.394x.630*	**13x20** *.512x.787*
22	→	→	→	**8x12** *.315x.472*	**10x13** *.394x.512*	**10x13** *.394x.512*	**10x16** *.394x.630*	**13x26** *.512x1.024*
33	→	→	**8x12** *.315x.472*	**10x13** *.394x.512*	**10x16** *.394x.630*	**10x16** *.394x.630*	**10x20** *.394x.787*	**13x30** *.512x1.181*
47	→	**8x12** *.315x.472*	**10x13** *.394x.512*	**10x13** *.394x.512*	**10x16** *.394x.630*	**10x20** *.394x.787*	**13x20** *.512x.787*	**13x42** *.512x1.654*
68	**8x12** *.315x.472*	**10x13** *.394x.512*	**10x13** *.394x.512*	**10x16** *.394x.630*	**10x20** *.394x.787*	**13x26** *.512x1.024*	**13x26** *.512x1.024*	
100	**10x13** *.394x.512*	**10x16** *.394x.630*	**10x16** *.394x.630*	**10x20** *.394x.787*	**13x20** *.512x.787*	**13x26** *.512x1.024*	**13x42** *.512x1.654*	
150	**10x16** *.394x.630*	**10x20** *.394x.787*	**13x20** *.512x.787*	**13x20** *.512x.787*	**13x26** *.512x.1.024*	**13x38** *.512x1.496*		
220	**10x20** *.394x.787*	**10x20** *.394x.787*	**13x20** *.512x.787*	**13x26** *.512x1.024*	**13x26** *.512x1.024*	**13x42** *.512x1.654*		
330	**13x20** *.512x.787*	**13x20** *.512x.787*	**13x26** *.512x1.024*	**13x30** *.512x1.181*	**13x42** *.512x1.654*			
470	**13x20** *.512x.787*	**13x26** *.512x1.024*	**13x38** *.512x1.496*	**13x42** *.512x1.654*				
680	**13x26** *.512x1.024*	**13x38** *.512x1.496*	**13x42** *.512x1.654*					
1000	**13x30** *.512x1.181*	**13x42** *.512x1.654*						

EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 25 °C

W.V. / FREQ. / μF	6.3		10		16		25		35		50		63		100	
	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz
2.2	→	→	→	→	→	→	→	→	→	→	→	→	→	→	*32.00*	*22.00*
3.3	→	→	→	→	→	→	→	→	→	→	→	→	*20.00*	*11.00*	*19.00*	*10.00*
4.7	→	→	→	→	→	→	→	→	→	→	→	→	*14.00*	*8.00*	*13.00*	*7.00*
6.8	→	→	→	→	→	→	→	→	→	→	→	→	*13.00*	*6.00*	*12.00*	*5.00*
10	→	→	→	→	→	→	→	→	→	→	*6.60*	*3.50*	*6.60*	*3.00*	*6.60*	*3.00*
15	→	→	→	→	→	→	→	→	*6.40*	*3.20*	*5.90*	*3.20*	*5.90*	*2.70*	*5.90*	*2.60*
22	→	→	→	→	→	→	*4.20*	*2.00*	*4.00*	*1.80*	*4.00*	*1.70*	*3.00*	*1.60*	*3.00*	*1.50*
33	→	→	→	→	*3.20*	*2.00*	*2.80*	*1.70*	*2.70*	*1.40*	*2.30*	*1.40*	*2.30*	*1.20*	*2.70*	*1.20*
47	→	→	*3.50*	*1.90*	*2.30*	*1.50*	*2.00*	*1.20*	*1.90*	*1.00*	*1.90*	*1.00*	*1.90*	*1.00*	*0.88*	*0.35*
68	*2.60*	*1.70*	*2.20*	*1.40*	*1.70*	*1.20*	*1.50*	*0.84*	*1.30*	*0.70*	*1.30*	*0.70*	*1.20*	*0.60*		
100	*1.80*	*1.20*	*1.40*	*0.90*	*1.20*	*0.76*	*0.90*	*0.57*	*0.80*	*0.40*	*0.76*	*0.39*	*0.60*	*0.30*		
150	*1.20*	*0.76*	*1.00*	*0.63*	*0.79*	*0.50*	*0.69*	*0.38*	*0.64*	*0.32*	*0.59*	*0.32*				
220	*0.80*	*0.52*	*0.67*	*0.39*	*0.48*	*0.34*	*0.40*	*0.26*	*0.44*	*0.22*	*0.40*	*0.22*				
330	*0.54*	*0.35*	*0.40*	*0.26*	*0.28*	*0.17*	*0.27*	*0.16*	*0.26*	*0.14*						
470	*0.38*	*0.25*	*0.24*	*0.16*	*0.20*	*0.12*	*0.16*	*0.10*								
680	*0.26*	*0.17*	*0.22*	*0.14*	*0.14*	*0.09*										
1000	*0.18*	*0.10*	*0.12*	*0.07*												

PERMISSIBLE RIPPLE CURRENT mA RMS MAX AT 100KHz 85°C IMPEDANCE (Ω) MAX AT 25°C 100KHz								
μF \ W.V.	6.3	10	16	25	35	50	63	100
2.2								94
								14
3.3							110	130
							9.3	9.1
4.7							140	170
							6.5	6.0
6.8							158	164
							4.5	4.0
10					130	200	240	250
					4.2	3	2.9	1.8
15					167	278	301	389
					2.8	2.2	2.1	1.5
22				250	330	337	370	600
				1.50	1.4	1.4	1.2	1.0
33			240	370	420	446	492	676
			0.90	0.90	0.9	0.85	0.8	0.7
47		260	340	360	500	587	688	1100
	0.90	0.90	0.70	0.65	0.65	0.65	0.2	
68	156	211	256	412	503	909	909	
	1.2	0.90	0.80	0.50	0.5	0.5	0.4	
100	236	420	450	660	1000	1103	1350	
	0.7	0.60	0.50	0.34	0.3	0.26	0.2	
150	338	467	614	876	962	1579		
	0.6	0.50	0.45	0.40	0.4	0.35		
220	517	780	920	1165	1165	2002		
	0.33	0.30	0.26	0.16	0.15	0.15		
330	744	1010	1310	1524	1743			
	0.25	0.20	0.12	0.12	0.12			
470	888	1420	1480	2081				
	0.17	0.12	0.12	0.06				
680	1170	1502	2500					
1000	1517	2900						
	0.09	0.06						

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES								
W.V.	6.3	10	16	25	35	50	63	100
Z-55°C/Z+20°C	4	4	3	3	3	3	3	3

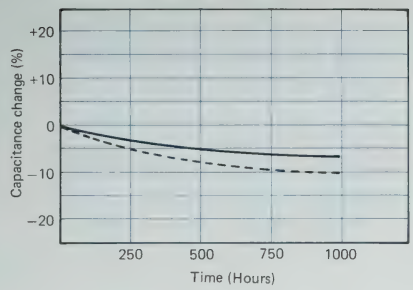
TYPICAL TEST DATA

— — — — 22 μF 25V

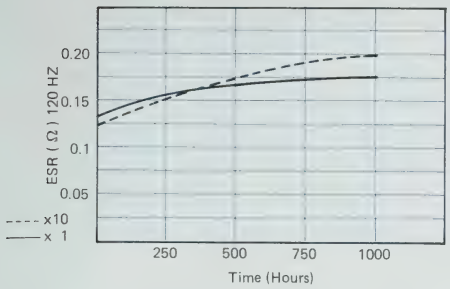
——— 680 μF 16V

LIFE TEST

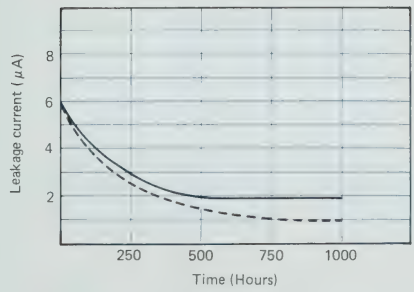
Capacitance change vs. time (at +105 °C)



ESR vs. time (at +105 °C)

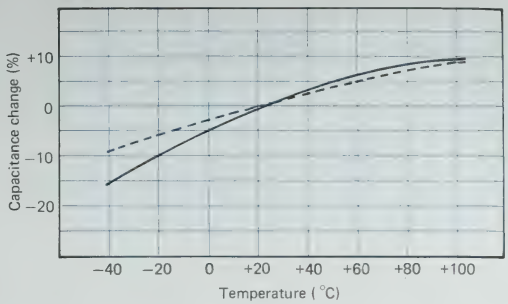


Leakage current vs. time (at +105 °C)

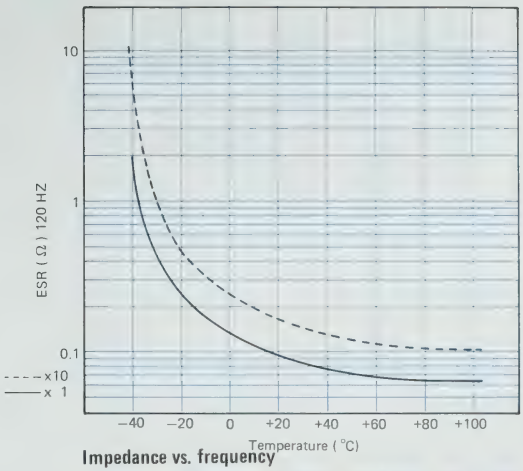


TEMPERATURE CHARACTERISTICS

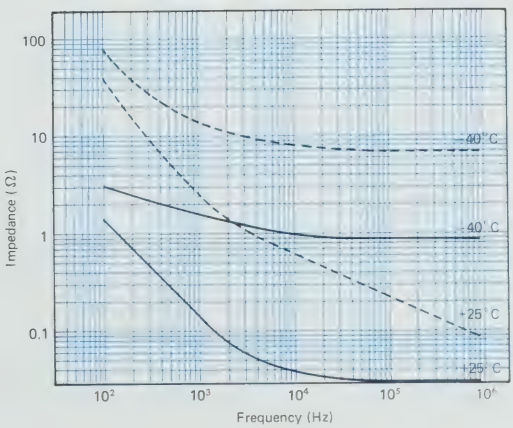
Capacitance change vs. temperature



ESR vs. temperature



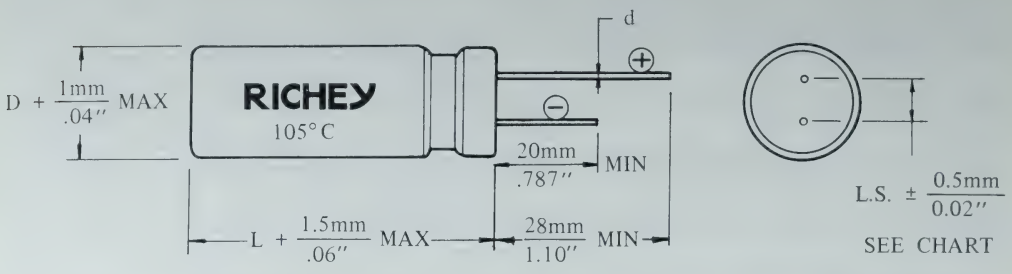
Impedance vs. frequency



RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE PSRX

RADIAL LEAD POLAR 105°C LOW IMPEDANCE AND ESR HIGH RIPPLE AT HIGH FREQUENCY

SMALLER SIZE AND EXTENDED CAPACITANCE RANGE COMPARED TO TYPE **PSR**



D	8	10	13	16	18
	.315	.394	.512	.630	.709
L.S.	3.5	5.0	5.0 6.5 7.5	7.5	7.5
	.138	.197	.197 .256.295	.295	.295
d	0.5	0.6	0.6 0.8 0.6	0.8	0.8
	.020	.024	.024 .031.024	.031	.031

SPECIFICATIONS:

Voltage Range	6.3 – 100 V
Operating Temperature	−40°C +105°C
Capacitance Range	4.7μF – 4700μF
Capacitance Tolerance	± 20% (M) 120HZ, 25°C
D.C. Leakage Current *after two minutes*	0.01 CVμA

LIFE TEST: After application of rated voltage at 105°C for 1000 hours, the following limits shall apply when the capacitor has been stabilized at 25°C.

Capacitance Change : ± 15% max of initial value.
ESR at 120HZ and 1KHZ : Less than 200% of specified value.
D.C. Leakage Current : Not greater than specified value.

SHELF TEST: After storage at 105°C for 500 hours without voltage applied, the following limits shall apply when the capacitor has been stabilized at 25°C.

Capacitance Change : ± 10% max of initial value.
ESR at 120HZ and 1KHZ : Less than 115% of specified value.
D.C. Leakage Current : Less than 200% of specified value.

DIMENSIONS DXL								
W.V. / S.V. / μF	6.3	10	16	25	35	50	63	100
	8	13	20	32	44	63	80	125
4.7								10x13 .394x.512
6.8								10x16 .394x.630
10							8x12 .315x.472	10x16 .394x.630
15						8x12 .315x.472	10x13 .394x.512	10x16 .394x.630
22					8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787
33					10x13 .394x.512	10x16 .394x.630	10x16 .394x.630	13x20 .512x.787
47				8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x38 .512x1.496
68			8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	16x38 .630x1.496
100		8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	
150	8x12 .315x.472	10x13 .394x.512	10x16 .394x.630	10x20 .394x.787	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	
220	10x13 .394x.512	10x16 .394x.630	10x16 .394x.630	13x20 .512x.787	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	
330	10x16 .394x.630	10x20 .394x.787	10x20 .394x.787	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	16x38 .630x1.496	
470	10x20 .394x.787	13x20 .512x.787	13x20 .512x.787	16x25 .630x.984	16x25 .630x.984	16x38 .630x1.496		
680	13x20 .512x.787	13x26 .512x1.024	13x30 .512x1.181	16x31 .630x1.220	16x38 .630x1.496			
1000	13x26 .512x1.024	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	18x34 .709x1.339			
1500	13x26 .512x1.024	16x25 .630x.984	16x31 .630x1.220	16x38 .630x1.496				
2200	16x25 .630x.984	16x31 .630x1.220	18x34 .709x1.339					
3300	16x38 .630x1.496	18x34 .709x1.339						
4700	18x34 .709x1.339							

PERMISSIBLE RIPPLE CURRENTS mA RMS MAX AT 100KHZ 105°C								
μF \ W.V.	6.3	10	16	25	35	50	63	100
4.7	→	→	→	→	→	→	→	*39*
6.8	→	→	→	→	→	→	→	*57*
10	→	→	→	→	→	→	*66*	*84*
15	→	→	→	→	→	*78*	*96*	*104*
22	→	→	→	→	*90*	*116*	*126*	*139*
33	→	→	→	→	*132*	*154*	*154*	*199*
47	→	→	→	*96*	*157*	*183*	*202*	*306*
68	→	→	*112*	*189*	*204*	*243*	*286*	*414*
100	→	*148*	*158*	*205*	*273*	*347*	*381*	
150	*162*	*215*	*246*	*336*	*393*	*466*	*522*	
220	*233*	*282*	*268*	*477*	*523*	*632*	*691*	
330	*309*	*380*	*333*	*641*	*717*	*846*	*914*	
470	*405*	*532*	*652*	*855*	*855*	*1091*		
680	*573*	*702*	*918*	*1125*	*1215*			
1000	*762*	*852*	*1167*	*1365*	*1511*			
1500	*906*	*1121*	*1474*	*1688*				
2200	*1188*	*1431*	*1875*					
3300	*1624*	*1815*						
4700	*1807*							

WHEN THE CAPACITORS ARE OPERATED AT A TEMPERATURE AND FREQUENCY OTHER THAN 105°C AND 100KHZ, USE THE FOLLOWING MULTIPLYING FACTORS TO OBTAIN THE PERMISSIBLE RIPPLE CURRENT.

°C \ FREQ. HZ	120	1K	10K	100K
105	*0.67*	*0.83*	*1*	*1*
85	*1.33*	*1.66*	*2*	*2*
75	*1.86*	*2.5*	*2.8*	*2.8*
50	*2.4*	*3.2*	*3.6*	*3.6*

EQUIVALENT SERIES RESISTANCE (Ω) MAX. AT 25°C																
W.V. / FREQ. / μF	6.3		10		16		25		35		50		63		100	
	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz
4.7	→													→	21.16	10.58
6.8	→													→	14.63	7.31
10	→												9.95	4.97	9.95	4.97
15	→										6.63	3.32	6.63	3.32	6.63	3.32
22	→								5.27	2.26	4.52	2.26	4.52	2.26	4.52	2.26
33	→								3.52	1.51	3.01	1.51	3.01	1.51	3.01	1.51
47	→						2.47	1.27	2.47	1.06	2.12	1.06	2.12	1.06	2.12	1.06
68	→				1.95	1.46	1.71	0.88	1.71	0.73	1.46	0.73	1.46	0.73	1.46	0.73
100	→		1.99	1.19	1.33	0.995	1.16	0.60	1.16	0.50	1.00	0.50	1.00	0.50		
150	1.66	1.33	1.33	0.80	0.88	0.66	0.77	0.40	0.77	0.33	0.66	0.33	0.66	0.33		
220	1.13	0.90	0.90	0.54	0.60	0.45	0.53	0.27	0.53	0.23	0.45	0.23	0.45	0.23		
330	0.75	0.60	0.60	0.36	0.40	0.30	0.35	0.18	0.35	0.15	0.30	0.15	0.30	0.15		
470	0.53	0.42	0.42	0.25	0.28	0.21	0.25	0.13	0.25	0.11	0.21	0.11				
680	0.37	0.29	0.29	0.18	0.20	0.15	0.17	0.088	0.17	0.073						
1000	0.25	0.20	0.20	0.12	0.13	0.099	0.12	0.060	0.12	0.050						
1500	0.18	0.13	0.14	0.081	0.10	0.068	0.088	0.041								
2200	0.13	0.092	0.11	0.056	0.075	0.047										
3300	0.095	0.063	0.080	0.039												
4700	0.081	0.046														

IMPEDANCE (Ω) MAX AT 25°C 100KHZ								
W.V. / μF	6.3	10	16	25	35	50	63	100
4.7	→	→	→	→	→	→	→	5.70
6.8	→	→	→	→	→	→	→	4.00
10	→	→	→	→	→	→	1.40	2.40
15	→	→	→	→	→	1.05	0.94	1.60
22	→	→	→	→	0.98	0.71	0.64	1.40
33	→	→	→	→	0.58	0.50	0.42	0.73
47	→	→	→	0.55	0.53	0.35	0.30	0.51
68	→	→	0.80	0.40	0.29	0.23	0.21	0.05
100	→	0.78	0.54	0.26	0.23	0.16	0.14	
150	0.67	0.52	0.36	0.17	0.15	0.12	0.10	
220	0.45	0.36	0.29	0.12	0.09	0.08	0.08	
330	0.30	0.24	0.17	0.10	0.06	0.05	0.05	
470	0.21	0.17	0.12	0.06	0.05	0.05		
680	0.15	0.12	0.10	0.06	0.05			
1000	0.14	0.10	0.09	0.06	0.05			
1500	0.09	0.07	0.06	0.05				
2200	0.07	0.05	0.05					
3300	0.05	0.05						
4700	0.05							

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES								
W.V.	6.3	10	16	25	35	50	63	100
Z -55°C / Z+20° C	4	4	3	3	3	3	3	3

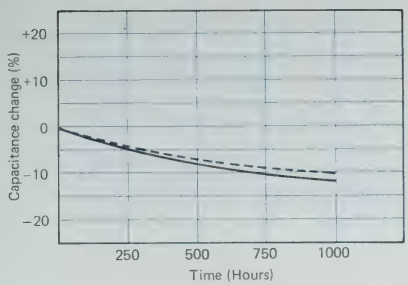
TYPICAL TEST DATA

– – – – 100μF 25V

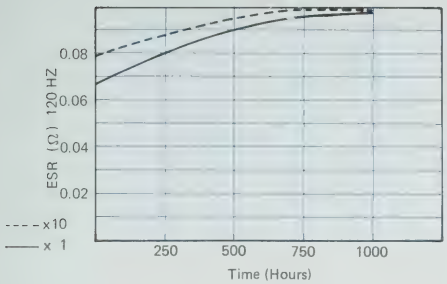
——— 2200μF 10V

LIFE TEST

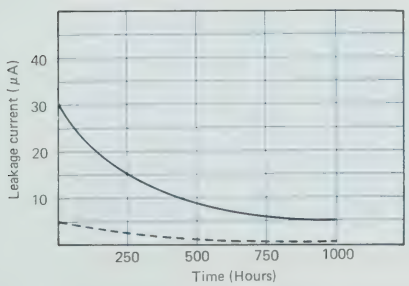
Capacitance change vs. time (at +105 °C)



ESR vs. time (at +105 °C)

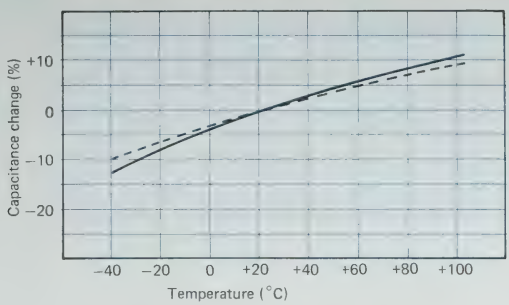


Leakage current vs. time (at +105 °C)

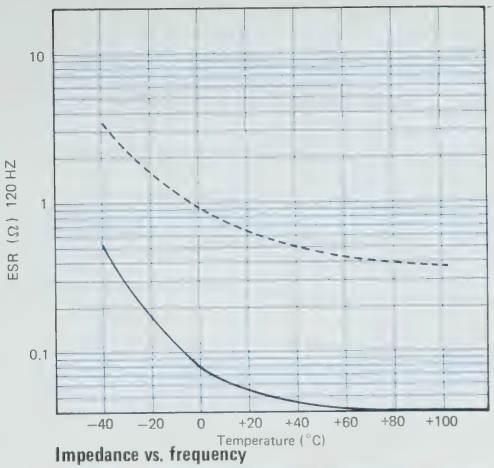


TEMPERATURE CHARACTERISTICS

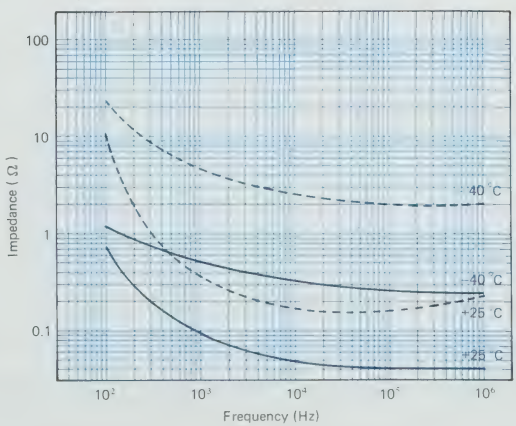
Capacitance change vs. temperature



ESR vs. temperature

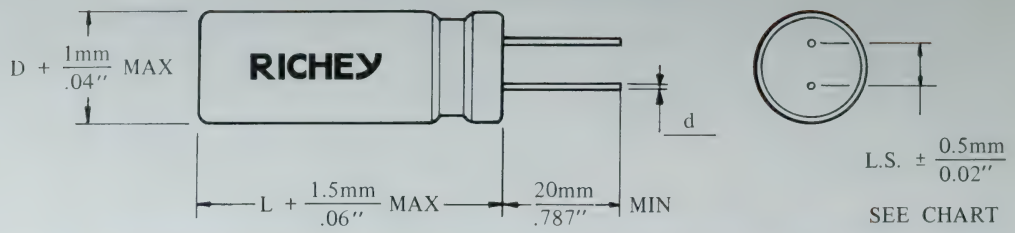


Impedance vs. frequency



RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE NC

RADIAL LEAD · NON POLAR GENERAL PURPOSE



LEAD DIMENSIONS:

D	5	6	8	10	13	16	18	22	25
	.197	.236	.315	.394	.512	.630	.709	.866	.984
L.S.	2.0	.25	3.5	5.0	5.0 6.5 7.5	7.5	7.5	10	12.5
	.08	.098	.138	.197	.197 .256.295	.295	.295	.394	.492
d	0.5	0.5	0.5	0.6	0.6 0.8 0.6	0.8	0.8	1.0	1.0
	.020	.020	.020	.024	.024 .031.024	.031	.031	.04	.04

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 160V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	1 μF – 10000 μF
CAPACITANCE TOLERANCE	–10% +50% 120HZ 25°C
D.C. LEAKAGE CURRENT *AFTER 5 MINUTES*	0.03CV OR 3 μA MINIMUM

DISSIPATION FACTOR (TAN δ) AT 120HZ 25°C											
W.V.	6.3	10	16	25	35	40	50	63	80	100	160
TAN δ	0.24	0.20	0.16	0.16	0.14	0.14	0.12	0.10	0.10	0.09	0.10
Tan δ values to be increased by 0.02 per 1000 μF for capacitance values greater than 1000 μF.											

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES											
W.V.	6.3	10	16	25	35	40	50	63	80	100	160
Z –25°C/Z+20°C	4	3	2	2	2	2	2	2	2	2	2
Z –40°C/Z+20°C	8	6	4	4	3	3	3	3	3	3	3

FOR TYPICAL TEST DATA SEE PAGE

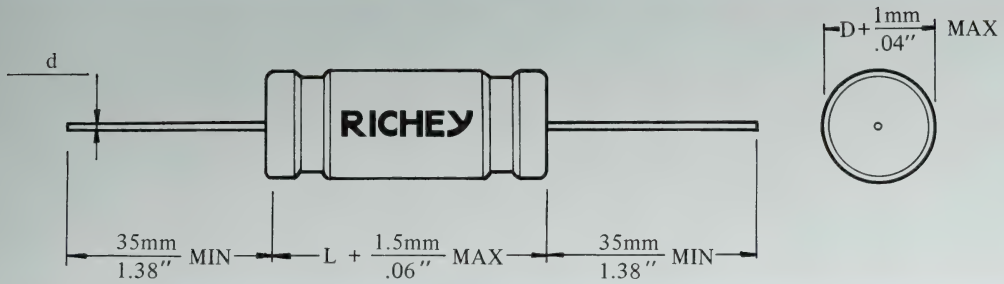
DIMENSIONS D X L

W.V. / μF	6.3	10	16	25	35	40	50	63	80	100	160
1	→	→	→	→	→	→	→	5x11	5x11	6x11	8x13
								.197x.433	.197x.433	.236x.433	.315x.512
2.2	→	→	→	→	→	→	5x11	6x11	6x11	8x12	10x13
							.197x.433	.236x.433	.236x.433	.315x.472	.394x.512
3.3	→	→	→	→	→	5x11	6x11	8x12	8x12	8x12	10x16
						.197x.433	.236x.433	.315x.472	.315x.472	.315x.472	.394x.630
4.7	→	→	→	5x11	6x11	6x11	6x11	8x12	8x12	8x12	10x16
				.197x.433	.236x.433	.236x.433	.236x.433	.315x.472	.315x.472	.315x.472	.394x.630
6.8	→	→	5x11	6x11	6x11	8x12	8x12	8x12	10x13	10x13	10x20
			.197x.433	.236x.433	.236x.433	.315x.472	.315x.472	.315x.472	.394x.512	.394x.512	.394x.787
10	→	→	5x11	6x11	8x12	8x12	8x12	10x13	10x13	10x16	10x26
			.197x.433	.236x.433	.315x.472	.315x.472	.315x.472	.394x.512	.394x.512	.394x.630	.394x1.024
15	→	5x11	6x11	8x12	8x12	8x12	10x13	10x13	10x16	10x20	13x26
		.197x.433	.236x.433	.315x.472	.315x.472	.315x.472	.394x.512	.394x.512	.394x.630	.394x.787	.512x1.024
22	5x11	6x11	8x12	8x12	10x13	10x13	10x13	10x16	10x20	10x20	13x30
	.197x.433	.236x.433	.315x.472	.315x.472	.394x.512	.394x.512	.392x.512	.394x.630	.394x.787	.394x.787	.512x.1.181
33	6x11	6x11	8x12	10x13	10x13	10x13	10x16	10x16	10x20	10x26	16x31
	.236x.433	.236x.433	.315x.472	.394x.512	.394x.512	.394x.512	.394x.630	.394x.630	.394x.787	.394x1.024	.630x1.220
47	6x11	8x12	8x12	10x13	10x16	10x16	10x16	10x20	10x26	13x20	16x39
	.236x.433	.315x.472	.315x.472	.394x.512	.394x.630	.394x.630	.394x.630	.394x.787	.394x1.024	.512x.787	.630x1.535
68	8x12	8x12	10x13	10x13	10x16	10x20	10x26	13x20	13x26	13x26	16x51
	.315x.472	.315x.472	.394x.512	.394x.512	.394x.630	.394x.787	.394x1.024	.512x.787	.512x1.024	.512x1.024	.630x2.008
100	8x12	8x12	10x13	10x16	10x20	10x20	10x26	13x20	13x30	16x31	18x57
	.315x.472	.315x.472	.394x.512	.394x.630	.394x.787	.394x.787	.394x1.024	.512x.787	.512x1.181	.630x1.220	.709x2.244
150	10x13	10x13	10x16	10x20	10x26	13x20	13x26	13x26	16x31	16x38	22x57
	.394x.512	.394x.512	.394x.630	.394x.787	.394x1.024	.512x.787	.512x1.024	.512x1.024	.630x1.220	.630x1.496	.866x2.244
220	10x13	10x16	10x20	10x26	13x20	13x26	13x26	16x31	16x38	16x45	25x64
	.394x.512	.394x.630	.394x.787	.394x1.024	.512x.787	.512x1.024	.512x1.024	.630x1.220	.630x1.496	.630x1.772	.984x2.520
330	10x16	10x20	10x26	13x20	13x26	13x30	16x31	16x31	16x51	18x49	
	.394x.630	.394x.787	.394x1.024	.512x.787	.512x1.024	.512x1.181	.630x1.220	.630x1.220	.630x2.008	.709x1.929	
470	10x20	10x26	13x20	13x26	16x31	16x31	16x31	16x45	18x49	22x51	
	.394x.787	.394x1.024	.512x.787	.512x1.024	.630x1.220	.630x1.220	.630x1.220	.630x1.772	.709x1.929	.866x2.008	
680	13x20	13x20	13x26	16x31	16x38	16x45	16x51	18x49	22x57	25x64	
	.512x.787	.512x.787	.512x1.024	.630x1.220	.630x1.496	.630x1.772	.630x2.008	.709x1.929	.866x2.244	.984x2.520	
1000	13x26	13x26	13x30	16x31	16x38	16x45	16x51	22x51	25x64		
	.512x1.024	.512x1.024	.512x1.181	.630x1.220	.630x1.496	.630x1.772	.630x2.008	.866x2.008	.984x2.520		
1500	16x25	16x31	16x31	16x45	18x57	22x51	22x51	25x64			
	.630x.984	.630x1.220	.630x1.220	.630x1.772	.709x2.244	.866x2.008	.866x2.008	.984x2.520			
2200	16x31	16x31	16x38	16x51	22x51	22x51	25x64				
	.630x1.220	.630x1.220	.630x1.496	.630x2.008	.866x2.008	.866x2.008	.984x2.520				
3300	16x31	16x38	16x51	22x51	25x64	25x64					
	.630x1.220	.630x1.496	.630x2.008	.866x2.008	.984x2.520	.984x2.520					
4700	16x45	16x51	22x51	25x64							
	.630x1.772	.630x2.008	.866x2.008	.984x2.520							
6800	18x57	22x51	25x64								
	.709x2.244	.866x2.008	.984x2.520								
10000	22x51	22x57	25x64								
	.866x2.008	.866x2.244	.984x2.520								

PREMISSABLE RIPPLE CURRENTS mA MAX AT 120HZ 85 ℃ MAXIMUM EQUIUALENT SERIES RESISTANCE (Ω) 120HZ 85 ℃											
μF \ W.V.	6.3	10	16	25	35	40	50	63	80	100	160
1								19	19	21	25
								147.4	147.4	132.6	147.4
2.2							25	30	30	38	41
							80.38	66.98	66.98	60.29	66.98
3.3						29	34	44	44	47	54
						62.52	53.59	44.66	44.66	40.19	44.66
4.7				32	37	37	40	53	53	56	65
				50.17	43.90	43.90	37.63	31.35	31.35	28.22	31.35
6.8			38	42	45	54	58	64	72	76	85
			34.67	34.67	30.34	30.34	26.01	21.67	21.67	19.50	21.67
10			46	51	65	65	71	88	88	100	115
			23.58	23.58	20.63	20.63	17.68	14.73	14.74	13.26	14.74
15		51	62	25	80	80	98	107	116	133	156
		19.65	15.72	15.72	13.75	13.75	11.79	9.824	9.824	8.842	9.824
22	56	67	91	91	110	110	119	140	153	161	200
	16.08	13.40	10.72	10.72	9.378	9.378	8.038	6.698	6.698	6.029	6.698
33	75	82	111	126	134	134	157	172	187	220	265
	10.72	8.931	7.145	7.145	6.252	6.252	5.359	4.466	4.466	4.019	4.466
47	90	119	133	150	173	173	187	224	249	263	347
	7.525	6.271	5.017	5.017	4.390	4.390	3.763	3.135	3.135	2.822	3.135
68	130	143	181	181	208	227	274	300	332	350	468
	5.201	4.334	3.467	3.467	3.034	3.034	2.601	2.167	2.167	1.950	2.167
100	158	173	219	236	276	276	332	363	427	486	503
	3.537	2.947	2.358	2.358	2.063	2.063	1.768	1.474	1.474	1.326	1.474
150	219	240	290	316	376	376	450	493	565	647	595
	2.358	1.965	1.572	1.572	1.375	1.375	1.179	.9824	.9824	.8842	.9824
220	265	314	383	426	456	505	545	584	743	341	263
	1.608	1.340	1.072	1.072	.9378	.9378	.8038	.6698	.6698	.6129	.6698
330	351	419	522	522	618	655	765	838	1031	913	
	1.072	.8931	.7145	.7145	.6252	.6252	.5359	.4466	.4466	.4019	
470	457	557	623	590	845	845	913	1166	1023	1060	
	.7525	.6271	.5017	.5017	.4390	.4390	.3763	.3135	.3135	.2822	
680	612	670	830	951	1104	1185	1350	1230	1267	1415	
	.5201	.4334	.3467	.3467	.3034	.3034	.2601	.2167	.2167	.1950	
1000	822	900	1066	1153	1339	1437	1638	1466	1627		
	.3537	.2947	.2358	.2358	.2063	.2063	.1768	.1474	.1474		
1500	1039	1233	1370	1597	1591	1466	1575	1900			
	.2456	.2063	.1670	.1670	.1474	.1474	.1277	.1081			
2200	1342	1458	1751	1983	1719	1719	2040				
	.1742	.1474	.1206	.1206	.1072	.1072	.0938				
3300	1584	1857	2305	1884	2230	2203					
	.1250	.1072	.0893	.0893	.0804	.0804					
4700	2061	2304	2052	2277							
	.1003	.0878	.0753	.0753							
6800	2187	2139	2536								
	.0780	.0693	.0607								
10000	2263	2491	2791								
	.0619	.0560	.0501								

RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE NA

AXIAL LEAD NON POLAR GENERAL PURPOSE



LEAD DIMENSIONS:

D	5	6	8	10	13	16
	.197	.236	.315	.394	.512	.630
d	0.6	0.6	0.6	0.6	0.8	0.8
	.024	.024	.024	.024	.031	.031

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 160V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	1μF – 4700μF
CAPACITANCE TOLERANCE	–10% +50% 120HZ 25°C
LEAKAGE CURRENT *AFTER 5 MINUTES*	0.03CV OR 3μA MINIMUM

DISSIPATION FACTOR (TAN δ) AT 120HZ 25°C											
W.V.	6.3	10	16	25	35	40	50	63	80	100	160
TAN δ	0.24	0.20	0.16	0.16	0.14	0.14	0.12	0.10	0.10	0.09	0.10
Tan δ values to be increased by 0.02 per 1000μF for capacitance values greater than 1000μF.											

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES											
W.V.	6.3	10	16	25	35	40	50	63	80	100	160
Z–25°C/ Z+20°C	4	3	2	2	2	2	2	2	2	2	2
Z–40°C/ Z+20°C	8	6	4	4	3	3	3	3	3	3	3

FOR TYPICAL TEST DATA SEE PAGE

RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE NA

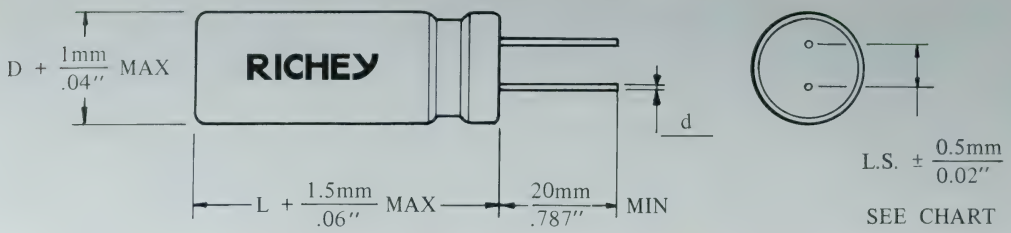
DIMENSIONS D X L

μF \ W.V.	6.3	10	16	25	35	40	50	63	80	100	160
1	→	→	→	→	→	→	→	→	6x16	6x16	6x19
									.236x.630	.236x.630	.236x.748
2.2	→	→	→	→	→	→	→	→	6x16	6x19	8x19
									.236x.630	.236x.748	.315x.748
3.3	→	→	→	→	→	→	6x16	6x19	6x19	6x19	10x22
							.236x.630	.236x.748	.236x.748	.236x.748	.394x.866
4.7	→	→	→	→	→	→	6x16	6x19	8x19	8x19	10x22
							.236x.630	.236x.748	.315x.748	.315x.748	.394x.866
6.8	→	→	→	→	→	6x16	6x19	6x19	8x19	8x19	10x25
						.236x.630	.236x.748	.236x.748	.315x.748	.315x.748	.394x.984
10	→	→	→	6x16	6x19	6x19	6x19	8x19	8x19	8x19	10x32
				.236x.630	.236x.748	.236x.748	.236x.748	.315x.748	.315x.748	.315x.748	.394x1.260
15	→	→	→	6x16	6x19	6x19	8x19	8x19	10x22	10x22	13x32
				.236x.630	.236x.748	.236x.748	.315x.748	.315x.748	.394x.866	.394x.866	.512x1.260
22	→	6x16	6x19	6x19	8x19	8x19	8x19	10x22	10x22	10x25	13x38
		.236x.630	.236x.748	.236x.748	.315x.748	.315x.748	.315x.748	.394x.866	.394x.866	.394x.984	.512x1.496
33	→	6x16	6x19	8x19	8x19	8x19	10x22	10x22	10x25	10x32	13x41
		.236x.630	.236x.748	.315x.748	.315x.748	.315x.748	.394x.866	.394x.866	.394x.984	.394x1.260	.512x1.614
47	→	6x19	8x19	8x19	10x22	10x22	10x22	10x25	10x32	13x32	16x44
		.236x.748	.315x.748	.315x.748	.394x.866	.394x.866	.394x.866	.394x.984	.394x1.260	.512x1.260	.630x1.700
68	→	→	8x19	8x19	10x22	10x22	10x25	10x32	13x32	13x38	16x57
			.315x.748	.315x.748	.394x.866	.394x.866	.394x.984	.394x1.260	.512x1.260	.512x1.496	.630x2.244
100	→	8x19	8x19	10x22	10x25	10x25	10x32	13x32	13x38	13x38	
		.315x.748	.315x.748	.394x.866	.394x.984	.394x.984	.394x1.260	.512x1.260	.512x1.496	.512x1.496	
150	→	10x22	10x22	10x25	10x32	10x32	13x32	13x38	16x38	16x44	
		.394x.866	.394x.866	.394x.984	.394x1.260	.394x1.260	.512x1.260	.512x1.496	.630x1.496	.630x 1.700	
220	→	10x22	10x25	10x33	13x33	13x33	13x38	13x41	16x44	16x51	
		.394x.866	.394x.984	.394x1.299	.512x1.299	.512x1.299	.512x1.457	.512x1.614	.630x 1.700	.630x2.008	
330	10x22	10x25	10x32	13x32	13x38	13x38	16x38	16x38	16x57		
	.394x.866	.394x.984	.394x1.260	.512x1.260	.512x1.496	.512x 1.496	.630x1.496	.630x1.496	.630x2.244		
470	10x25	10x32	13x32	13x38	13x41	16x38	16x44	16x51			
	.394x.984	.394x1.260	.512x1.260	.512x1.496	.512x1.614	.630x1.496	.630x1.732	.630x2.008			
680	10x32	13x32	13x38	13x41	16x44	16x51	16x51				
	.394x1.260	.512x1.260	.512x1.496	.512x1.614	.630x1.732	.630x2008	.630x2.008				
1000	13x32	13x32	13x41	16x45	16x51	16x57					
	.512x1.260	.512x1.260	.512x1.614	.512x1.772	.630x2.008	.630x2.244					
1500	13x38	16x38	16x45	16x51							
	.512x1.496	.630x1.496	.630x1.772	.630x2.008							
2200	16x38	16x38	16x51								
	.630x1.496	.630x1.496	.630x2.008								
3300	16x45	16x51									
	.630x1.772	.630x2.008									
4700	16x57										
	.630x2.244										

PREMISSABLE RIPPLE CURRENTS mA RMS MAX AT 120HZ 85 °C MAXIMUM EQUIUALENT SERIES RESISTANCE (Ω) 120HZ 85 °C											
μF \ W.V.	6.3	10	16	25	35	40	50	63	80	100	160
1									24	25	25
									147.4	132.6	147.4
2.2									35	40	44
									66.98	60.29	66.98
3.3							39	46	46	49	62
							53.59	44.66	44.66	40.19	44.66
4.7							47	55	64	67	74
							37.63	31.35	31.35	28.22	31.35
6.8						52	61	66	77	81	93
						30.34	26.01	21.67	21.67	19.50	21.67
10				59	68	68	73	93	93	98	126
				23.58	20.63	20.63	17.68	14.74	14.74	13.26	14.74
15				72	83	83	103	114	131	138	170
				15.72	13.75	13.75	11.79	9.824	9.824	8.842	9.824
22		78	94	94	116	116	126	159	159	177	221
		13.40	10.72	10.72	9.378	9.378	8.038	6.698	6.698	6.029	6.698
33		96	116	133	143	143	178	195	205	240	280
		8.931	7.145	7.145	6.252	6.252	5.359	4.466	4.466	4.019	4.466
47		123	159	159	197	197	212	245	272	317	369
		6.271	5.017	5.017	4.390	4.390	3.763	3.135	3.135	2.822	3.135
68		208	191	191	236	236	269	327	361	409	491
		2.947	3.467	3.467	3.034	3.034	2.601	2.167	2.167	1.950	2.167
100		294	232	268	302	302	363	438	471	497	
		1.965	2.358	2.358	2.063	2.063	1.768	1.474	1.474	1.326	
150		356	328	346	411	411	590	577	614	688	
		1.340	1.572	1.572	1.375	1.375	1.179	.9824	.9824	.8842	
220		459	419	466	549	549	638	722	798	887	
		.8931	1.072	1.072	.9378	.9378	.8038	.6698	.6698	.6029	
330	398	609	570	629	723	723	831	910	1082		
	1.072	.6271	.7145	.7145	.6252	.6252	.5359	.4466	.4466		
470	500	808	751	807	892	918	1054	1230			
	.7525	.4334	.5017	.5017	.4390	.4390	.3763	.3135			
680	668	980	971	1003	1174	1250	1350				
	.5201	.2947	.3467	.3467	.3034	.3034	.2601				
1000	894	1339	1217	1344	1516	1591					
	.3537	.2063	.2358	.2358	.2063	.2063					
1500	1154	1584	1597	1685							
	.2456	.1474	.1670	.1670							
2200	1457	2103	1983								
	.1742	.1072	.1206								
3300	1846										
	.1250										
4700	2282										
	.1003										

RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE NC(L)

RADIAL LEAD - NON POLAR FOR CROSSOVER NETWORKS



LEAD DIMENSIONS:

D	10	13	16	18	22	25
	.394	.512	.630	.709	.866	.984
L.S.	5.0	5.0 6.5 7.5	7.5	7.5	10	12.5
	.197	.197 .256.295	.295	.295	.394	.492
d	0.6	0.6 0.8 0.6	0.8	0.8	1.0	1.0
	.024	.024 .031.024	.031	.031	.04	.04

SPECIFICATIONS:

VOLTAGE RANGE	25V – 100V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	1μF – 330μF
CAPACITANCE TOLERANCE	± 20% AT 1 KHZ 25°C
D.C. LEAKAGE CURRENT *AFTER 5 MINUTES*	0.03CV OR 3μA MINIMUM
DISSIPATION FACTOR (TANδ)	0.10 AT 1 KHZ 25°C.
IMPEDANCE (Z) RATIO	
Z(–25°C) /Z (20°C)	2.0 AT 1KHz
Z(–40°C) /Z (20°C)	3.0 AT 1KHz

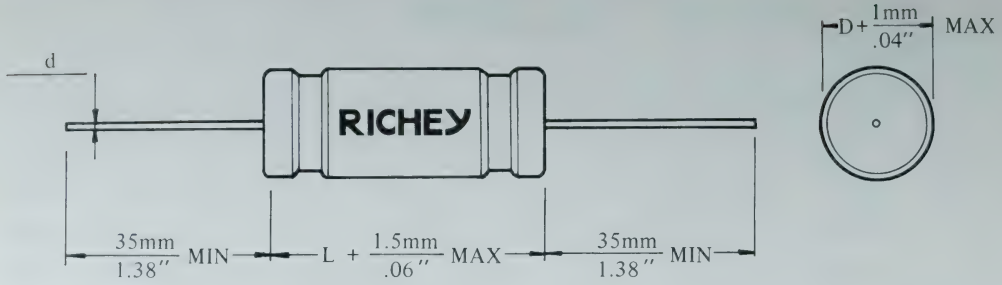
FOR TYPICAL TEST DATA SEE PAGE

DIMENSIONS D X L									
μF \ W.V.	25	50	63	75	100				
1					10x13				
					.394x.512				
1.5					10x13				
					.394x.512				
2.2					10x13				
					.394x.512				
3.3					10x13				
					.394x.512				
4.7					10x13				
					.394x.512				
6.8				10x13	10x16				
				.394x.512	.394x.630				
10			10x13	10x16	10x20				
			.394x.512	.394x.630	.394x.787				
15	10x13	10x16	10x20	10x20	10x26				
	.394x.512	.394x.630	.394x.787	.394x.787	.394x1.024				
22	10x13	10x16	10x20	10x26	13x20				
	.394x.512	.394x.630	.394x.787	.394x1.024	.512x.787				
33	10x16	10x26	13x20	13x26	13x30				
	.394x.630	.394x1.024	.512x.787	.512x1.024	.512x1.181				
47	10x20	13x20	13x26	13x30	13x38				
	.394x.787	.394x.787	.512x1.024	.512x1.181	.512x1.496				
68	10x26	13x26	13x30	16x31	16x31				
	.394x1.024	.512x1.024	.512x1.181	.630x1.220	.630x1.220				
100	13x20	16x25	16x31	16x38	18x49				
	.512x.787	.630x.984	.630x1.220	.630x1.496	.709x1.929				
150	13x26	16x31	16x38	18x49	18x55				
	.512x1.024	.630x1.220	.630x1.496	.709x1.929	.709x2.165				
220	13x30	16x38	18x49	18x55	22x51				
	.512x1.181	.630x1.496	.799x1.929	.709x2.165	.866x2.008				
330	16x31	18x49	22x51	22x57	25x64				
	.630x1.220	.709x1.929	.866x2.008	.866x2.244	.984x2.520				

PERMISSIBLE RIPPLE CURRENTS mA RMS MAX. AT 120HZ 85 ℃									
μF \ W.V.	25	50	63	75	100				
1					89				
1.5					108				
2.2					130				
3.3					160				
4.7					190				
6.8				190	250				
10			270	290	330				
15	280	320	390	390	510				
22	340	410	460	530	560				
33	450	560	590	640	690				
47	550	670	690	750	830				
68	700	820	860	920	920				
100	900	1200	1330	1480	1740				
150	1050	1310	1380	1710	1800				
220	1175	1510	1820	2190	2300				
330	1450	1900	2280	2600	2790				

RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE NA(L)

AXIAL LEAD NON POLAR FOR CROSSOVER NETWORKS



LEAD DIMENSIONS:

D	8	10	13	16	18	22	25
	.315	.394	.512	.630	.709	.866	.984
d	0.6	0.6	0.8	0.8	0.8	0.8	0.8
	.024	.024	.031	.031	.031	.031	.031

SPECIFICATIONS:

VOLTAGE RANGE	25V – 100V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	1μF – 330μF
CAPACITANCE TOLERANCE	± 20% AT 1KHZ 25°C
D.C. LEAKAGE CURRENT *AFTER 5 MINUTES*	0.03CV OR 3μA MINIMUM
DISSIPATION FACTOR (TAN δ)	0.10 AT 1KHZ 25°C.
IMPEDANCE (Z) RATIO	
Z(–25°C) /Z (20°C)	2.0 AT 1KHz
Z(–40°C) /Z (20°C)	3.0 AT 1KHz

FOR TYPICAL TEST DATA SEE PAGE

DIMENSIONS D X L									
μF \ W.V.	25	50	63	75	100				
1	→	→	→	→	8x19 .315x.748				
1.5	→	→	→	→	8x19 .315x.748				
2.2	→	→	→	→	8x19 .315x.748				
3.3	→	→	→	→	8x19 .315x.748				
4.7	→	→	→	→	8x19 .315x.748				
6.8	→	→	8x19 .315x.748	10x22 .394x.866	10x22 .394x.866				
10	→	8x19 .315x.748	10x22 .394x.866	10x22 .394x.866	10x25 .394x.984				
15	8x19 .315x.748	10x22 .394x.866	10x22 .394x.866	10x25 .394x.984	10x32 .394x1.260				
22	8x19 .315x.748	10x22 .394x.866	10x25 .394x.984	10x32 .394x1.260	13x32 .512x1.260				
33	10x22 .394x.866	10x32 .394x1.260	10x32 .394x1.260	13x32 .512x1.260	13x38 .512x1.496				
47	10x22 .394x.866	13x32 .512x1.260	13x32 .512x1.260	13x38 .512x1.496	13x41 .512x1.				
68	10x25 .394x.984	13x32 .512x1.260	13x38 .512x1.496	16x38 .630x1.496	16x44 .630x1.7				
100	10x32 .394x1.260	13x38 .512x1.496	16x38 .630x1.496	16x44 .630x1.7	16x51 .630x2.008				
150	13x32 .512x1.260	16x38 .630x1.496	16x44 .630x1.7	16x57 .630x2.244	22x48 .866x1.890				
220	13x41 .512x1.	16x51 .630x2.008	16x57 .630x2.244	25x48 .984x1.890					
330	16x38 .630x1.496	22x48 .866x1.890	25x48 .984x1.890						

PERMISSIBLE RIPPLE CURRENTS mA RMS MAX. AT 120HZ 85 °C									
μF \ W.V.	25	50	63	75	100				
1	→	→	→	→	90				
1.5	→	→	→	→	100				
2.2	→	→	→	→	135				
3.3	→	→	→	→	165				
4.7	→	→	→	→	195				
6.8	→	→	235	280	280				
10	→	280	330	330	360				
15	390	450	510	530	560				
22	420	490	520	550	580				
33	510	610	610	700	760				
47	580	730	730	830	860				
68	780	890	950	1000	1080				
100	1080	1350	1450	1570	1640				
150	1140	1420	1470	1610	1900				
220	1340	1710	1800	2200					
330	1570	2100	2400						

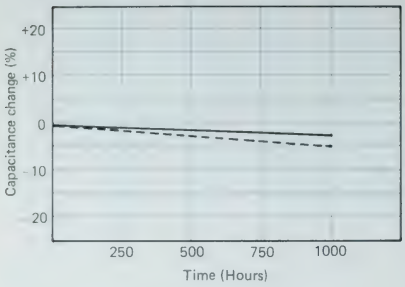
TYPICAL TEST DATA

— — — — 22μF 50V

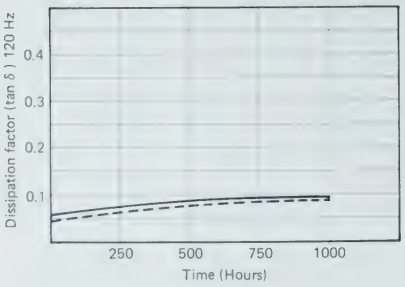
——— 220μF 50V

LIFE TEST

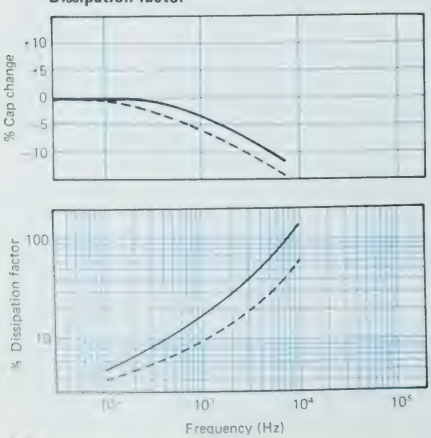
Capacitance change vs. time (at +85 °C)



Dissipation factor vs. time (at +85 °C)

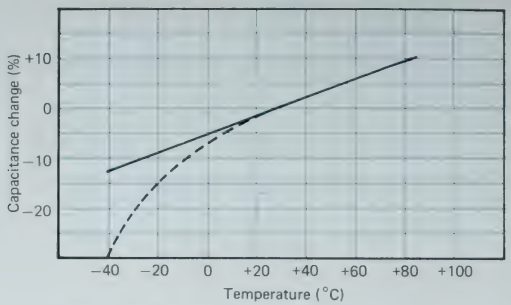


Capacitance vs. frequency
Dissipation factor

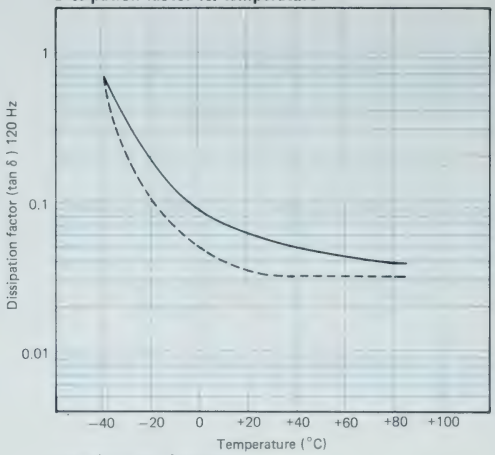


TEMPERATURE CHARACTERISTICS

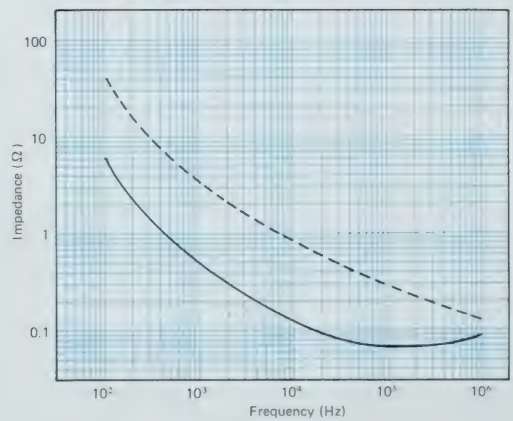
Capacitance change vs. temperature



Dissipation factor vs. temperature



Impedance vs. frequency



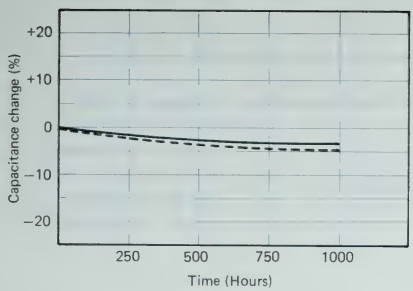
TYPICAL TEST DATA

— — — — 15μF 50V

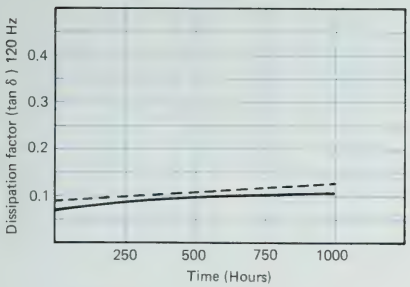
——— 330μF 50V

LIFE TEST

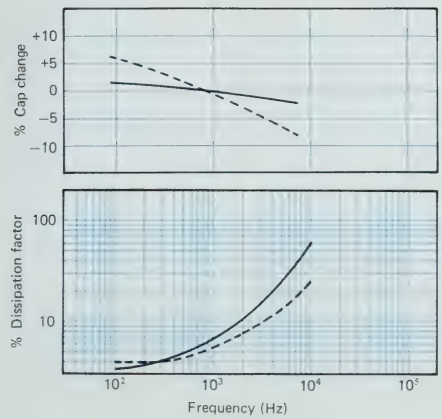
Capacitance change vs. time (at +85° C)



Dissipation factor vs. time (at +85° C)

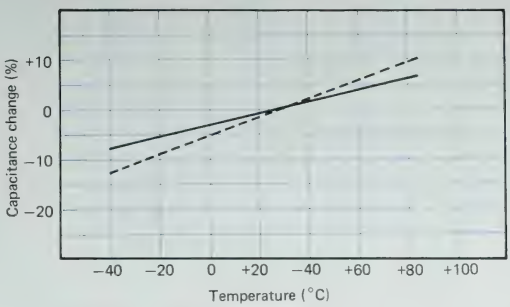


Capacitance vs. frequency
Dissipation factor

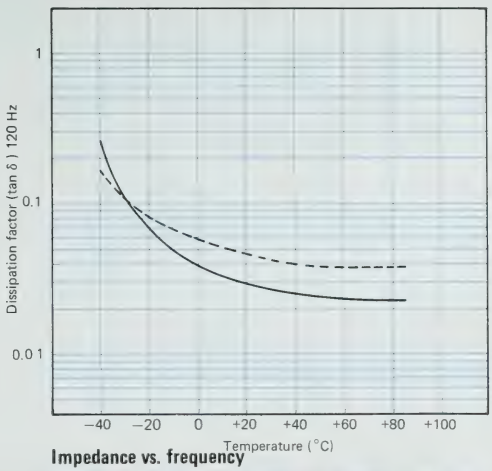


TEMPERATURE CHARACTERISTICS

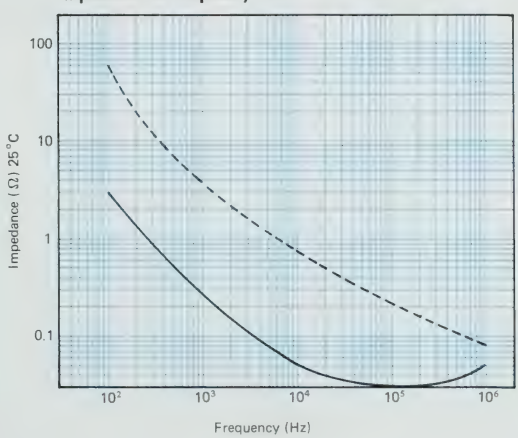
Capacitance change vs. temperature



Dissipation factor vs. temperature



Impedance vs. frequency



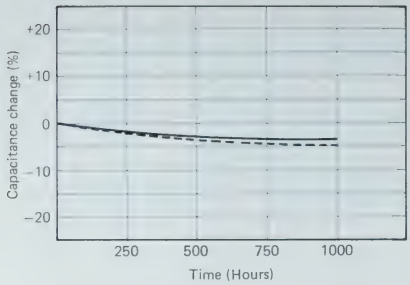
TYPICAL TEST DATA

— — — — 1.5μF 100V

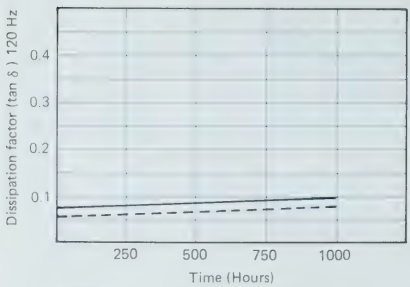
——— 10μF 50V

LIFE TEST

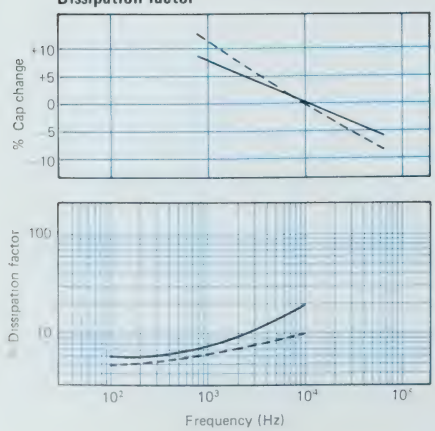
Capacitance change vs. time (at +85°C)



Dissipation factor vs. time (at +85°C)

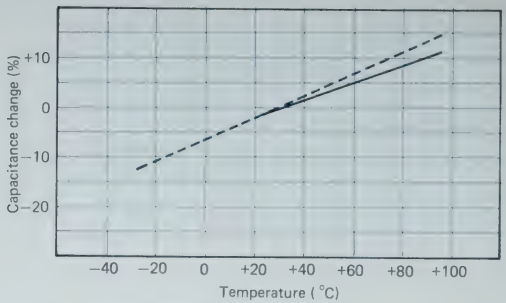


Capacitance
Dissipation factor **vs. frequency**

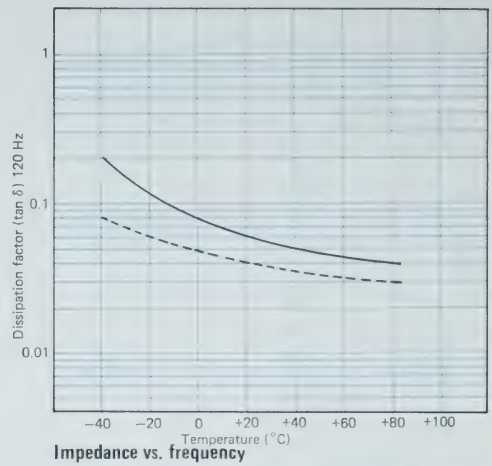


TEMPERATURE CHARACTERISTICS

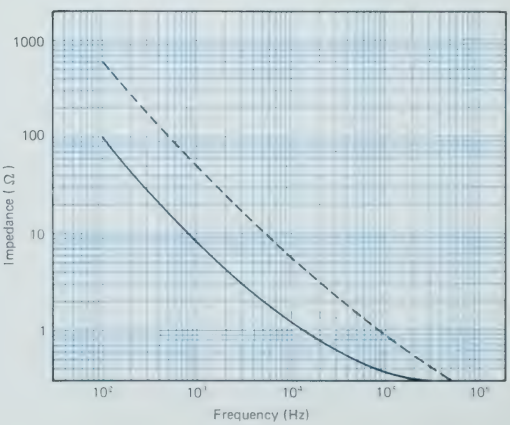
Capacitance change vs. temperature



Dissipation factor vs. temperature

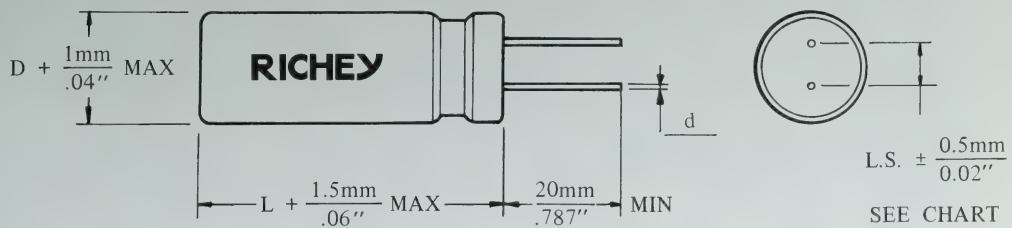


Impedance vs. frequency



RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE NC(TV)

RADIAL LEAD NON POLAR
FOR T.V. HORIZONTAL DEFLECTION CURRENT CORRECTION



SPECIFICATIONS:

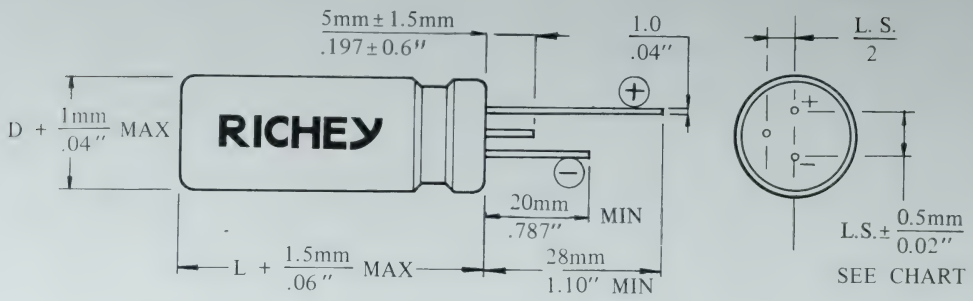
VOLTAGE (WORKING)	25VDC
OPERATING TEMPERATURE	−25°C +85°C
CAPACITANCE RANGE	2.2μF – 10μF
CAPACITANCE TOLERANCE	± 20% 120HZ 25°C
D.C. LEAKAGE CURRENT	0.2CVμA AFTER 5 MINUTES

DISSIPATION FACTOR (TAN δ): 0.05 AT 1KHZ 25°C.

CAPACITANCE μF		2.2	3.3	4.7	6.8	8.2	10
CASE SIZE D X L		16x25	16x31	16x36	16x36	16x36	16x36
		.630x.984	.630x1.220	.630x1.417	.630x1.417	.630x1.417	.630x1.417
MAX RIPPLE CURRENT 15.75 KHz 12 VDC APPLIED	85°C	4 Ap-p	4.5 Ap-p	5 Ap-p	5.5 Ap-p	6.5 Ap-p	7 Ap-p
	70°C	6 Ap-p	6.5 Ap-p	7.5 Ap-p	8 Ap-p	9 Ap-p	10 Ap-p

OTHER CAPACITANCE VALUES AND HIGHER VOLTAGES AVAILABLE UPON REQUEST.

RADIAL LEAD POLAR WITH AUXILIARY LEAD – LOW VOLTAGE



D	18	22	25	30
	.709	.866	.984	1.181
L.S.	7.5	10	12.5	15
	.295	.394	.492	.590

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 100V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	220μF – 33000μF
CAPACITANCE TOLERANCE	–10% +50% (T) 120HZ 25°C *OTHER TOLERANCES AVAILABLE UPON REQUEST*
LEAKAGE CURRENT *AFTER 5 MINUTES*	0.02 CV OR 3000μA MAXIMUM

LOW TEMPERATURE CHARACTERISTICS

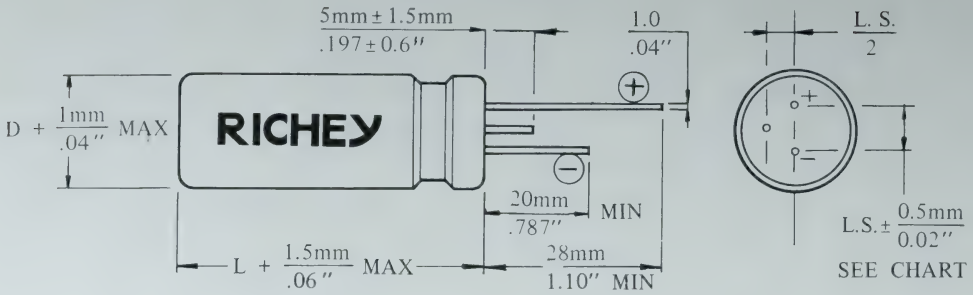
IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES										
W. V.	6.3	10	16	25	35	40	50	63	80	100
Z–25°C/Z+20°C	4	3	2	2	2	2	2	2	2	2
Z–40°C/Z+20°C	8	6	4	4	3	3	3	3	3	3

FOR TYPICAL TEST DATA SEE PAGE

DIMENSIONS DXL										
W.V / S.V. / µF	6.3	10	16	25	35	40	50	63	80	100
	8	13	20	32	44	50	63	80	100	125
220										**22x34**
										.866x1.339
330										**22x34**
										.866x1.339
470										**22x34**
										.866x1.339
680									**22x34**	**22x40**
									.866x1.339	*.866x1.575*
1000								**22x34**	**22x40**	**25x40**
								.866x1.339	*.866x1.575*	*.984x1.575*
1500							**22x34**	**22x40**	**25x40**	**25x51**
							.866x1.339	*.866x1.575*	*.984x1.575*	*.984x2.008*
2200					**22x34**	**22x34**	**22x40**	**25x40**	**25x51**	**30x51**
					.866x1.339	*.866x1.339*	*.866x1.575*	*.984x1.575*	*.984x2.008*	*1.181x2.008*
3300			**18x36**	**22x34**	**22x40**	**22x40**	**25x40**	**25x51**	**30x51**	**30x61**
			.709x1.417	*.866x1.339*	*.866x1.575*	*.866x1.575*	*.984x1.575*	*.984x2.008*	*1.181x2.008*	*1.181x2.402*
4700	**18x27**	**18x36**	**22x34**	**22x40**	**25x40**	**25x51**	**25x51**	**30x51**	**30x64**	
	.709x1.063	*.709x1.417*	*.866x1.339*	*.866x1.575*	*.984x1.575*	*.984x2.008*	*.984x2.008*	*1.181x2.008*	*1.181x2.520*	
6800	**18x36**	**22x34**	**22x40**	**25x40**	**25x51**	**25x64**	**30x51**	**30x64**		
	.709x1.417	*.866x1.339*	*.866x1.575*	*.984x1.575*	*.984x2.008*	*.984x2.520*	*1.181x2.008*	*1.181x2.520*		
10000	**22x34**	**22x40**	**25x40**	**25x64**	**30x64**	**30x64**				
	.866x1.339	*.866x1.575*	*.984x1.575*	*.984x2.520*	*1.181x2.520*	*1.181x2.520*				
15000	**25x40**	**25x51**	**25x64**	**30x64**						
	.984x1.575	*.984x2.008*	*.984x2.520*	*1.181x2.520*						
22000	**25x51**	**25x64**	**30x64**							
	.984x2.008	*.984x2.520*	*1.181x2.520*							
33000	**25x64**	**30x64**								
	.984x2.520	*1.181x2.520*								

PERMISSIBLE RIPPLE CURRENTS mA RMS MAX AT 120HZ 85°C EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz & 25°C										
W.V / µF	6.3	10	16	25	35	40	50	63	80	100
220										**580**
										1.206
330										**710**
										.8038
470										**840**
										.5644
680									**1020**	**1083**
									.3901	*.3901*
1000								**1381**	**1313**	**1420**
								.2947	*.2653*	*.2653*
1500							**1764**	**1520**	**1730**	**1910**
							.2063	*.2063*	*.1867*	*.1867*
2200					**1894**	**1650**	**2180**	**2000**	**2310**	**2589**
				.2144	*.1608*	*.1608*	*.1474*	*.1474*	*.1340*	*.1340*
3300			**1680**	**1993**	**2300**	**2150**	**2440**	**2480**	**3170**	**3467**
			.1742	*.1518*	*.1161*	*.1161*	*.1072*	*.1022*	*.0982*	*.0982*
4700	**1533**	**1730**	**2059**	**2300**	**2770**	**3063**	**3200**	**3589**	**4138**	
	.2132	*.1819*	*.1348*	*.1191*	*.0941*	*.0941*	*.0878*	*.0878*	*.0815*	
6800	**1954**	**2202**	**2640**	**3130**	**3670**	**4043**	**4317**	**4721**		
	.1560	*.1344*	*.1019*	*.0910*	*.0737*	*.0737*	*.0693*	*.0693*		
10000	**2434**	**2612**	**3210**	**3654**	**4190**	**5643**				
	.1149	*.1002*	*.0781*	*.0707*	*.0589*	*.0589*				
15000	**3015**	**3630**	**4750**	**5725**						
	.0865	*.0766*	*.0619*	*.0570*						
2200	**4013**	**4823**	**4419**							
	.0683	*.0616*	*.0516*							
33000	**5393**	**4577**								
	.0554	*.0509*								

RADIAL LEAD POLAR WITH AUXILIARY LEAD – HIGH VOLTAGE



D	18	22	25	30
	.709	.866	.984	1.181
L.S.	7.5	10	12.5	15
	.295	.394	.492	.590

SPECIFICATIONS:

VOLTAGE RANGE	160V – 500V
OPERATING TEMPERATURE	160V –40°C +85°C 200V – 500V –25°C +85°C
CAPACITANCE RANGE	33 μF – 680 μF
CAPACITANCE TOLERANCE	–10% +50% (T) 120HZ 25°C *OTHER TOLERANCES AVAILABLE UPON REQUEST*
LEAKAGE CURRENT *AFTER 5 MINUTES*	0.03 CV + 15 μA MAXIMUM CV ≤ 1000 0.02 CV + 25 μA MAXIMUM CV > 1000

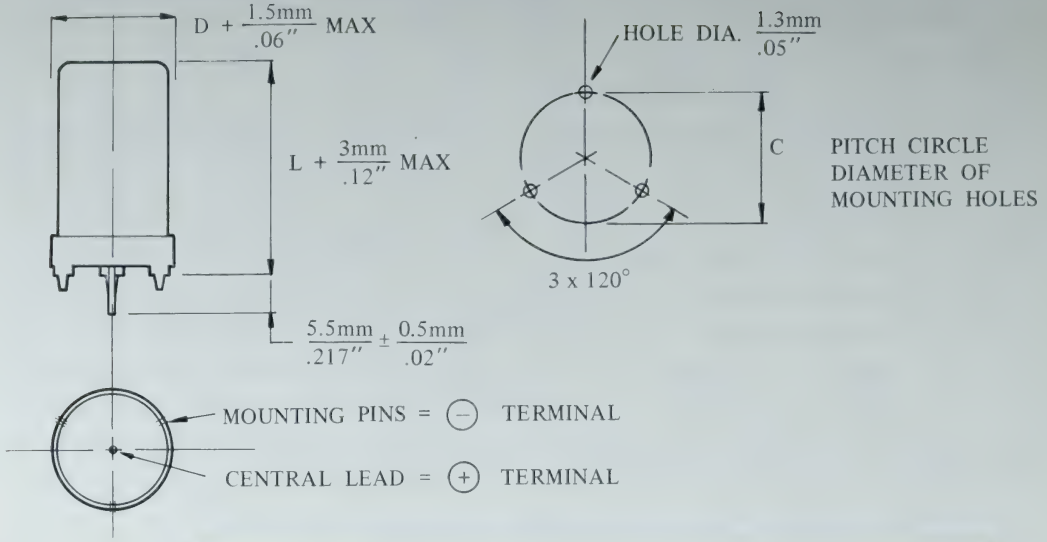
LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES							
W.V.	160	200	250	350	400	450	500
Z –25°C/Z+20°C	2	8	8	12	16	16	
Z –40°C/Z+20°C	3						

DIMENSIONS DXL									
W.V. / S.V. / μF	160	200	250	350	400	450	500		
	200	250	300	400	450	500	550		
33						**18x43**	**18x60**		
						.709x1.693	*.709x2.362*		
47					**18x43**	**22x40**	**22x59**		
					.709x1.693	*.866x1.575*	*.866x2.323*		
68				**18x54**	**22x46**	**22x53**	**25x65**		
				.709x2.126	*.866x1.811*	*.866x2.087*	*.984x2.559*		
100				**22x53**	**22x59**	**25x52**			
				.866x2.087	*.866x2.323*	*.984x2.047*			
150	**18x43**	**18x54**	**22x53**	**25x52**	**25x64**				
	.709x1.693	*.709x2.126*	*.866x2.087*	*.984x2.047*	*.984x2.520*				
220	**22x40**	**22x53**	**22x59**						
	.866x1.575	*.866x2.087*	*.866x2.323*						
330	**22x51**	**25x64**	**25x64**						
	.866x2.008	*.984x2.520*	*.984x2.520*						
470	**25x64**	**25x64**							
	.984x2.520	*.984x2.520*							
680	**30x64**								
	1.181x2.520								

PERMISSIBLE RIPPLE CURRENTS mA RMS MAX. AT 120HZ 85°C EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz & 25°C									
μF / W.V.	160	200	250	350	400	450	500		
33						**235**	**247**		
						8.931	*8.931*		
47					**280**	**323**	**336**		
					6.271	*6.271*	*6.271*		
68				**337**	**388**	**405**	**456**		
				4.334	*4.334*	*4.334*	*4.334*		
100				**471**	**491**	**553**	**2.947**		
				2.947	*2.947*	*2.947*			
150	**558**	**614**	**577**	**618**	**677**				
	.9824	*1.474*	*1.965*	*1.965*	*1.965*				
220	**748**	**856**	**734**						
	.6698	*1.005*	*1.340*						
330	**1022**	**1230**	**1004**						
	.4466	*.6698*	*.8931*						
470	**1456**	**1468**							
	.3135	*.4703*							
680	**1950**								
	.2167								

VERTICAL MOUNTING BRACKET – POLAR


D + 1.5mm / .06" MAX
L + 3mm / .12" MAX
5.5mm / .217" ± 0.5mm / .02"
HOLE DIA. 1.3mm / .05"
C
PITCH CIRCLE DIAMETER OF MOUNTING HOLES
3 x 120°
MOUNTING PINS = (–) TERMINAL
CENTRAL LEAD = (+) TERMINAL

D	16	18	22	25
	.630	.709	.866	.984
C	16.5	18.5	22.5	25.5
	.650	.729	.886	1.004

SPECIFICATIONS:

VOLTAGE RANGE	6.3V – 160V
OPERATING TEMPERATURE	–40°C +85°C
CAPACITANCE RANGE	100μF – 10000μF
CAPACITANCE TOLERANCE	–10% +50% (T) 120HZ 25°C
LEAKAGE CURRENT *AFTER 5 MINUTES*	0.005CV μA

DISSIPATION FACTOR (TAN δ) AT 120HZ 25°C									
W.V.	6.3	10	16	25	40	50	63	100	160
TAN δ	0.25	0.20	0.17	0.15	0.12	0.10	0.09	0.08	0.10
Tan δ values to be increased by 0.02 per 1000μF for ratings greater than 1000μF.									

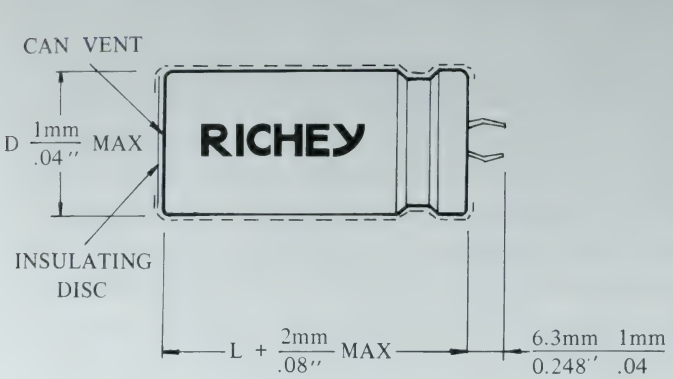
LOW TEMPERATURE CHARACTERISTICS

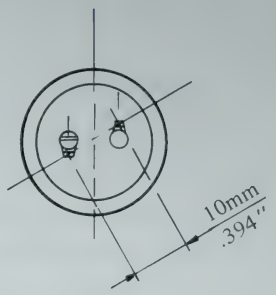
IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE FIGURES									
W.V.	6.3	10	16	25	40	50	63	100	160
Z-T°C/Z+20°C	4	3	2	2	2	2	2	2	2
Z-T°C/Z+20°C	8	6	4	4	3	3	3	3	3

DIMENSIONS DXL									
W.V. / S.V. / μF	6.3 / 8	10 / 13	16 / 20	25 / 32	40 / 50	50 / 63	63 / 80	100 / 125	160 / 185
100									18x34 / .709x1.339
150								16x26 / .630x1.024	18x40 / .709x1.575
220								16x32 / .630x1.260	22x40 / .866x1.575
330							16x26 / .630x1.024	18x34 / .709x1.339	25x40 / .984x1.575
470						16x26 / .630x1.024	16x32 / .630x1.260	22x34 / .866x1.339	25x51 / .984x2.008
680					16x26 / .630x1.024	16x32 / .630x1.260	18x34 / .709x1.339	25x34 / .984x1.339	
1000				16x26 / .630x1.024	16x32 / .630x1.260	18x34 / .709x1.339	22x34 / .866x1.339	25x47 / .984x1.850	
1500				16x32 / .630x1.260	18x40 / .709x1.575	22x40 / .866x1.575	22x40 / .866x1.575		
2200		16x26 / .630x1.024	16x26 / .630x1.024	18x34 / .709x1.339	22x40 / .866x1.575	25x40 / .984x1.575	25x47 / .984x1.850		
3300	16x26 / .630x1.024	16x32 / .630x1.260	18x34 / .709x1.339	22x34 / .866x1.339	25x40 / .984x1.575	25x47 / .984x1.850			
4700	16x32 / .630x1.260	18x34 / .709x1.339	22x34 / .866x1.339	25x34 / .984x1.339	25x47 / .984x1.850				
6800	22x34 / .866x1.339	22x34 / .866x1.339	22x40 / .866x1.575	25x47 / .984x1.850					
10000	22x40 / .866x1.575	25x34 / .984x1.339	25x40 / .984x1.575						

PERMISSIBLE RIPPLE CURRENTS mA RMS MAX. AT 120HZ 85°C EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz & 25°C									
μF / W.V.	6.3	10	16	25	40	50	63	100	160
100									428 / 1.474
150								491 / .7860	560 / .9824
220								645 / .5359	764 / .6698
330							687 / .4019	869 / .3573	1013 / .4466
470						778 / .3135	890 / .2822	1173 / .2508	1329 / .3135
680					854 / .2601	1015 / .2167	1177 / .1950	1530 / .1734	
1000				926 / .2210	1124 / .1768	1354 / .1474	1614 / .1326	2098 / .1179	
1500				1192 / .1474	1552 / .1179	1903 / .0982	1996 / .0823		
2200		1135 / .1340	1221 / .1139	1540 / .1005	2043 / .0804	2387 / .0670	2654 / .0603		
3300	1211 / .1116	1443 / .0893	1697 / .0759	2018 / .0670	2532 / .0536	2882 / .0447			
4700	1469 / .0784	1754 / .0627	2099 / .0533	2372 / .0470	2877 / .0376				
6800	2076 / .0542	2232 / .0433	2496 / .0368	2979 / .0325					
10000	2486 / .0368	2692 / .0295	2980 / .0251						

LARGE CAN SIZE – POLAR WITH LUG MOUNTING





SEE CHART FOR OPTIONAL LUG TYPES AND DIMENSIONS

SPECIFICATIONS:

VOLTAGE RANGE	16V – 500V
OPERATING TEMPERATURE	16V – 160V –40°C +85°C 200V – 250V –25°C +85°C
CAPACITANCE RANGE	22μF – 22000μF
CAPACITANCE TOLERANCE	–10% +50% 120HZ 25°C
LEAKAGE CURRENT *AFTER 5 MINUTES*	.02CV OR 3000μA MAXIMUM

LOW TEMPERATURE CHARACTERISTICS

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE EIGURES							
W.V.	16	25	35	50	63	80	100
Z–25°C/Z+20°C	3	2	2	2	2	2	2
Z–40°C/Z+20°C	12	4	4	4	3	3	3

IMPEDANCE (Z) RATIO AT 120Hz SHALL NOT EXCEED THESE EIGURES							
W.V.	160	200	250	350	400	450	500
Z–25°C/Z+20°C	2	8	8	12	16	16	16
Z–40°C/Z+20°C	3						

DIMENSIONS DXL (LOW VOLTAGE)

W.V. / S.V. / μF	16 / 20	25 / 32	35 / 44	50 / 63	63 / 80	80 / 100	100 / 125		
470						22x25 .866x.984	22x30 .866x1.181		
680					22x25 .866x.984	22x25 .866x.984	22x40 .866x1.575		
1000			22x25 .866x.984	22x25 .866x.984	22x30 .866x1.181	22x40 .866x1.575	25x40 .984x1.575		
1500			22x25 .866x.984	22x30 .866x1.181	22x40 .866x1.575	22x40 .866x1.575	25x52 .984x2.047		
2200		22x25 .866x.984	22x25 .866x.984	22x40 .866x1.575	25x40 .984x1.575	25x52 .984x2.047	30x52 1.181x2.047		
3300	22x25 .866x.984	22x30 .866x1.181	22x40 .866x1.575	25x40 .984x1.575	25x52 .984x2.047	30x52 1.181x2.047			
4700	22x25 .866x.984	22x40 .866x1.575	25x40 .984x1.575	25x50 .984x1.968	30x52 1.181x2.047				
6800	22x40 .866x1.575	25x40 .984x1.575	25x52 .984x2.047	30x52 1.181x2.047	30x52				
10000	25x40 .984x1.575	25x52 .984x2.047	30x52 1.181x2.047						
15000	30x40 1.181x1.575	30x52 1.181x2.047							
22000	30x52 1.181x2.047								

DIMENSIONS DXL (HIGH VOLTAGE)

W.V. / S.V. / μF	160 / 185	200 / 250	250 / 300	350 / 400	400 / 450	450 / 500	500 / 550		
22						22x25 .866x.984	22x30 .866x1.181		
33					22x25 .866x.984	22x30 .866x1.181	22x40 .866x1.575		
47				22x25 .866x.984	22x30 .866x1.181	22x40 .866x1.575	25x40 .984x1.575		
68			22x25 .866x.984	22x40 .866x1.575	22x40 .866x1.575	25x40 .984x1.575	25x52 .984x2.047		
100		22x30 .866x1.181	22x40 .866x1.575	25x40 .984x1.575	25x40 .984x1.575	30x52 1.181x2.047	30x52 1.181x2.047		
150	22x25 .866x.984	22x40 .866x1.575	25x40 .984x1.575	25x52 .984x2.047	30x52 1.181x2.047				
220	22x40 .866x1.575	25x40 .984x1.575	25x52 .984x2.047	30x52 1.181x2.047					
330	25x40 .984x1.575	25x52 .984x2.047	30x52 1.181x2.047						
470	25x52 .984x2.047	30x52 1.181x2.047							
680	30x52 1.181x2.047								

EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120 Hz & 25°C							
μF \ W.V.	16	25	35	50	63	80	100
22							
33							
47							
68							
100							
150							
220							
330							
470						.6271	.6271
680					.5418	.4334	.4334
1000			.3684	.3684	.3684	.2947	.2947
1500			.2456	.2456	.2456	.1965	.1965
2200		.2344	.1675	.1675	.1675	.1340	.1340
3300	.1563	.1563	.1116	.1116	.1116	.0893	
4700	.1097	.1097	.0784	.0784	.0784		
6800	.0758	.0758	.0542	.0542			
10000	.0516	.0516	.0368				
15000	.0344	.0344					
22000	.0234						

EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120Hz & 25°C							
μF \ W.V.	160	200	250	350	400	450	500
22						16.75	16.75
33					11.16	11.16	11.16
47				6.271	7.839	7.839	7.839
68			3.251	4.334	5.418	5.418	5.418
100		2.210	2.210	2.947	3.684	3.684	3.684
150	1.474	1.474	1.474	1.965	2.456		
220	1.005	1.005	1.005	1.340			
330	.6698	.6698	.6698				
470	.4703	.4703					
680	.3251						
1000							
1500							
2200							
3300							
4700							
6800							
10000							
15000							
22000							

PERMISSIBLE RIPPLE CURRENTS mA RMS MAXIMUM AT 120HZ 85 ℃

EQUIVALENT SERIES RESISTANCE (Ω) MAX AT 120 Hz & 25 ℃														
μF \ W.V.	16	25	35	50	63	80	100	160	200	250	350	400	450	500
22													150	160
													16.75	*16.75*
33												190	200	220
												11.16	*11.16*	*11.16*
47											250	240	260	280
											6.271	*7.839*	*7.839*	*7.839*
68										340	350	320	340	380
										3.251	*4.334*	*5.418*	*5.418*	*5.418*
100									470	490	460	420	510	510
									2.210	*2.210*	*2.947*	*3.684*	*3.684*	*3.684*
150								540	640	650	640	630		
								1.474	*1.474*	*1.474*	*1.965*	*2.456*		
220								780	840	890	850			
								1.005	*1.005*	*1.005*	*1.340*			
330								1030	1170	1190				
								.6698	*.6698*	*.6698*				
470						520	560	1390	1520					
						.6271	*.6271*	*.4703*	*.4703*					
680					560	630	750	1830						
					.5418	*.4334*	*.4334*	*.3251*						
1000			680	680	730	930	980							
			.3684	*3684*	*.3684*	*.2947*	*.2947*							
1500			830	890	990	1110	1360							
			.2456	*.2456*	*.2456*	*.1965*	*.1965*							
2200		850	1020	1200	1310	1650	1800							
		.2344	*.1675*	*.1675*	*.1675*	*.1340*	*.1340*							
3300	1050	1120	1480	1600	1810	2200								
	.1563	*.1563*	*.1116*	*.1116*	*.1116*	*.0893*								
4700	1250	1500	1910	2160	2360									
	.1097	*.1097*	*.0784*	*.0784*	*.0784*									
6800	1800	1940	2600	2840										
	.0758	*.0758*	*.0542*	*.0542*										
10000	2350	2660	3440											
	.0516	*.0516*	*.0368*											
15000	3220	3560												
	.0344	*.0344*												
22000	4310													
	.0234													

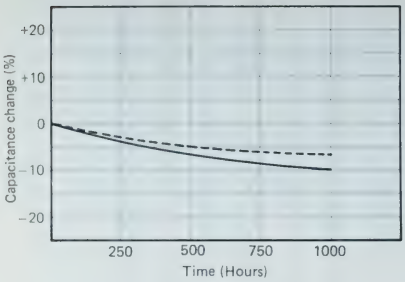
TYPICAL TEST DATA

— — — — 4,700 μF 16V

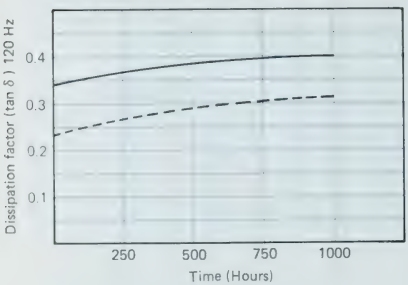
————10,000 μF 16V

LIFE TEST

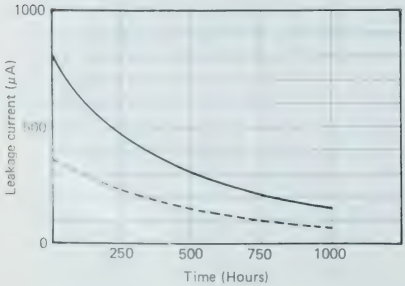
Capacitance change vs. time (at +85°C)



Dissipation factor vs. time (at +85°C)

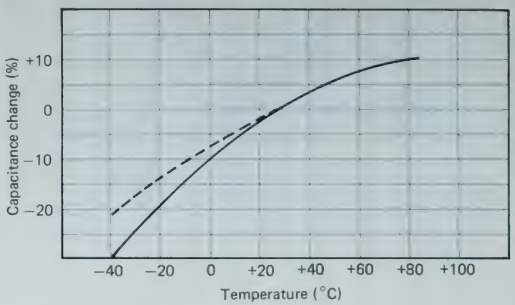


Leakage current vs. time (at + 85°C)

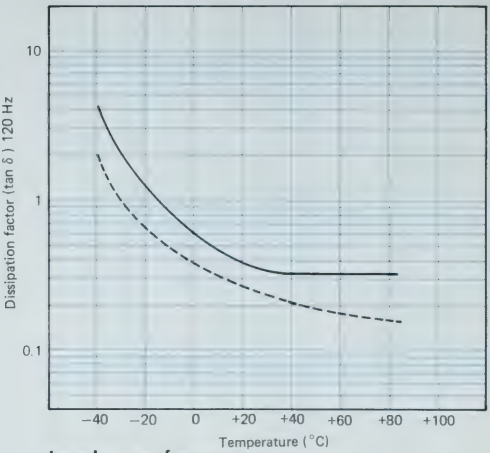


TEMPERATURE CHARACTERISTICS

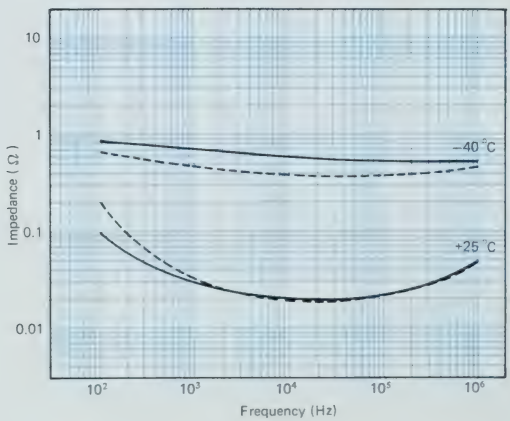
Capacitance change vs. temperature



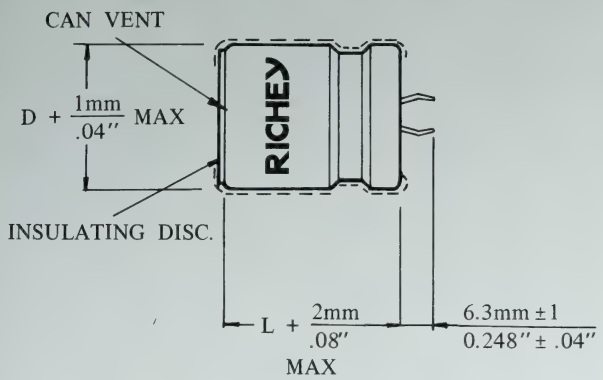
Dissipation factor vs. temperature

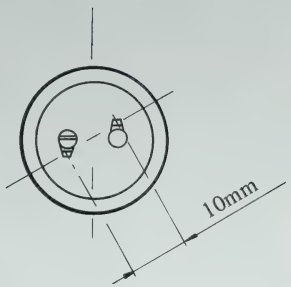


Impedance vs. frequency



LARGE CAN SIZE LOW PROFILE POLAR WITH LUG MOUNTING





SEE CHART FOR OPTIONAL LUG TYPES AND DIMENSIONS

SPECIFICATIONS:

VOLTAGE RANGE	16V – 250V
OPERATING TEMPERATURE	16V – 160V –40°C +85°C 200V – 250V –25°C +85°C
CAPACITANCE RANGE	220 μF – 15000 μF
CAPACITANCE TOLERANCE	–10% +50% 120HZ 25°C
LEAKAGE CURRENT *AFTER 5 MINUTES*	.02 CV OR 3000 μA MAXIMUM

LOW TEMPERATURE CHARACTERISTICS

THE IMPEDANCE (Z) RATIO SHALL NOT EXCEED THESE VALUES:

W. V.	16	25	35	50	63	80	100	160	200	250
Z–25 °C/Z+25 °C	*3*	*3*	*3*	*2*	*2*	*2*	*2*	*2*	*3*	*3*
Z–40 °C/Z+25 °C	*5*	*5*	*5*	*4*	*4*	*4*	*4*	*4*	–	

RICHEY ALUMINIUM ELECTROLYTIC CAPACITORS TYPE TRS

DIMENSIONS DXL

W.V. / S.V. / μF	16	25	35	50	63	80	100	160	200	250
	20	32	44	63	80	100	125	185	250	300
220								25x25	30x25	30x30
								.984x.984	1.181x.984	1.181x1.181
330								30x25	30x30	35x30
								1.181x.984	1.181x1.181	1.378x1.181
470							25x25	30x30	35x30	35x40
							.984x.984	1.181x1.181	1.378x1.181	1.378x1.575
680						25x25	30x25	35x30	35x40	35x52
						.984x.984	1.181x.984	1.378x1.181	1.378x1.575	1.378x2.047
1000				25x25	25x25	30x25	30x30	35x52	35x52	
				.984x.984	.984x.984	1.181x.984	1.181x1.181	1.378x2.047	1.378x2.047	
2200			25x25	30x25	30x30	35x30				
			.984x.984	1.181x.984	1.181x1.181	1.378x1.181				
3300		25x25	30x25	30x30	35x30					
		.984x.984	1.181x.984	1.181x1.181	1.378x1.181					
4700	25x25	30x25	30x30	35x30						
	.984x.984	1.181x.984	1.181x1.181	1.378x1.181						
6800	30x25	30x30	35x30							
	1.181x.984	1.181x1.181	1.378x1.181							
10000	30x30	35x30								
	1.181x1.181	1.378x1.181								
15000	35x30									
	1.378x1.181									

PERMISSIBLE RIPPLE CURRENTS mA RMS MAX AT 120HZ 85°C

MAXIMUM EQUIVALENT SERIES RESISTANCE (Ω) 120Hz 25°C

	16	25	35	50	63	80	100	160	200	250
220								710	800	790
								1.005	1.005	1.005
330								980	1040	1080
								.6698	.6698	.6698
470							570	1240	1370	1521
							.6271	.4703	.4703	.4703
680						680	770	1650	1830	2012
						.4334	.4334	.3251	.3251	.3251
1000				740	740	940	990	2440	2440	
				.3684	.3684	.2947	.2947	.2210	.2210	
2200			1100	1240	1320	1630				
			.1809	.1809	.1809	.1474				
3300		1140	1530	1620	1790					
		.1742	.1295	.1295	.1295					
4700	1360	1540	1930	2130						
	.1348	.1348	.1035	.1035						
6800	1850	1960	2570							
	.1019	.1019	.0802							
10000	2380	2640								
	.0781	.0781								
15000	3230									
	.0062									

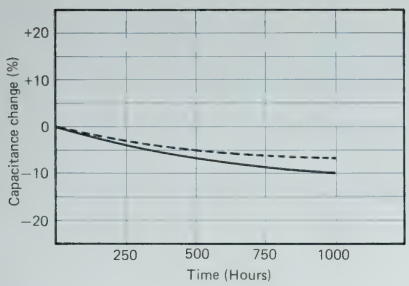
TYPICAL TEST DATA

— — — — 4,700 μF 16V

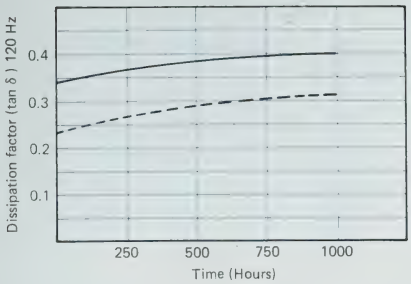
————10,000 μF 16V

LIFE TEST

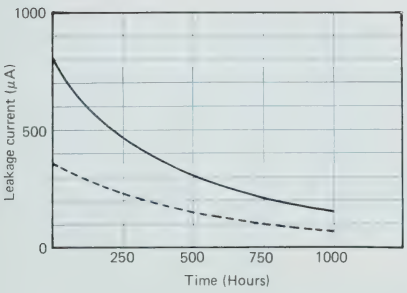
Capacitance change vs. time (at +85°C)



Dissipation factor vs. time (at +85°C)

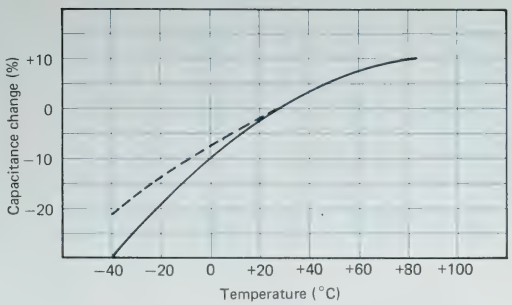


Leakage current vs. time (at + 85°C)

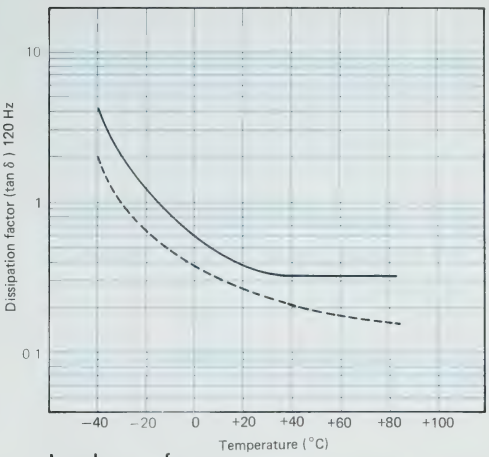


TEMPERATURE CHARACTERISTICS

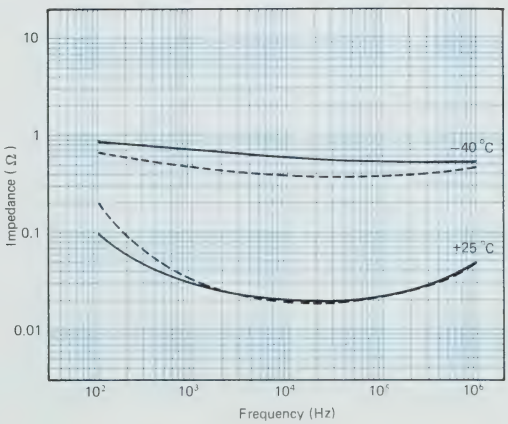
Capacitance change vs. temperature



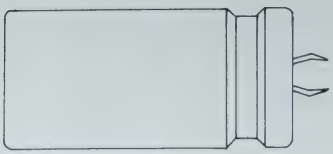
Dissipation factor vs. temperature



Impedance vs. frequency

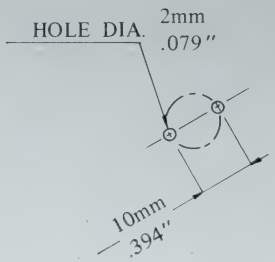


STANDARD MOUNTING LUG DIMENSIONS

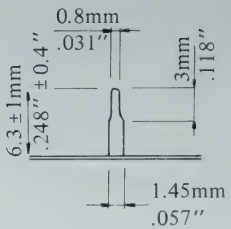


OPTION PS

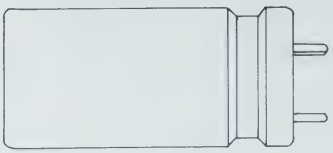
TWO TERMINAL SNAP-IN TYPE



PCB HOLE POSITION

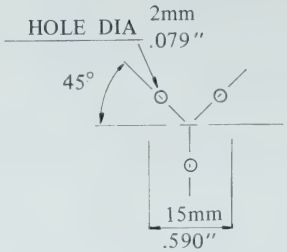


LUG DIMENSIONS

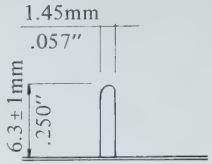


OPTION PC3

THREE TERMINAL PC TYPE



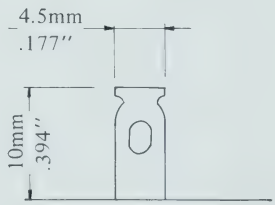
PCB HOLE POSITION



PIN DIMENSIONS

OPTION SL

SOLDER LUG TYPE

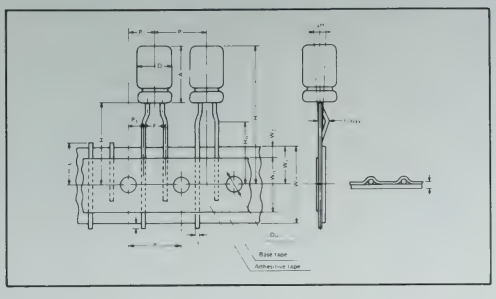


LUG DIMENSIONS

OTHER TYPES AVAILABLE UPON REQUEST.

RADIAL LEAD

Figure 1: Taping

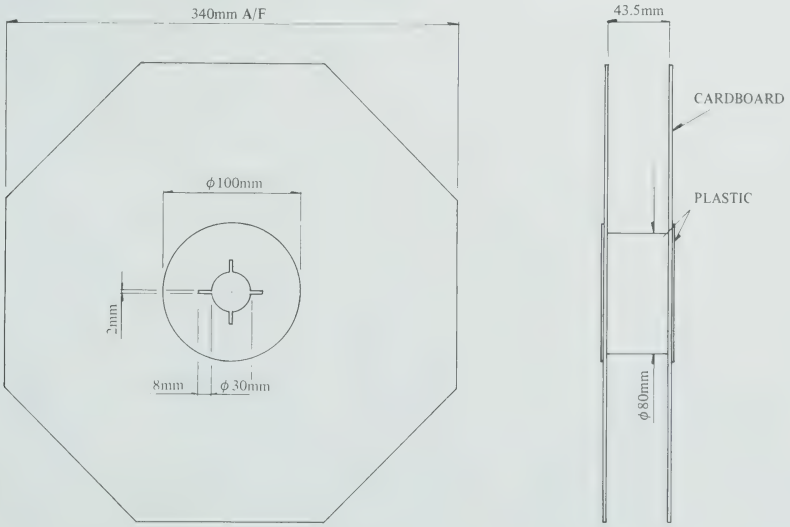


Dimensions (mm)

Item	Symbol	Nominal value	Tolerance	Remarks
Body diameter	D	ϕ4 to ϕ8	±0.5	
Body height	A	12.5	max.	(A=8 max. for **SM** Series)
Lead-wire diameter	d	0.5	±0.05	(d=0.45 for **SM** Series)
Pitch of component	P	12.7	±1.0	
Feed hole pitch	P_0	12.7	±0.3	(Cumulative pitch error: 1mm/20 pitch)
Hole center to lead	P_1	3.85	±0.7	To be measured at bottom of clinch
Feed hole center to component center	P_2	6.35	±1.3	
Lead to lead distance	F	5.0	−0.2/+0.8	
Component alignment, F-R	ΔH	0	±2.0	
Tape width	W	18.0	−0.5/+1.0	
Hole-down tape width	W_0	12.5	min.	
Hole position	W_1	9.0	−0.5/+0.75	
Hole-down tape position	W_2	3.0	max.	
Height of component from tape center	H	18.5 (ϕ5, ϕ6.3) 20.0 (ϕ8)	±0.75	H + A≦ H_1 * (H-17.5 for **SM** Series)
Lead-wire clinch height	H_0	16.0	±0.5	
Component height	H_1	32.25	max.	*
Lead-wire protrusion	l	2.0	max.	
Feed hole diameter	D_0	4.0	±0.3	
Total tape thickness	t	0.7	±0.2	
Length of snipped lead	L	11.0	max.	

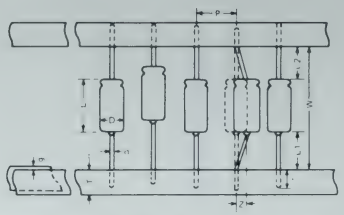
* For D=8, H=20.0±0.75 is available. In this case, the dimension of H_1 is not specified.

Figure 2: REELING



AXIAL LEAD

Figure 1:
TAPING



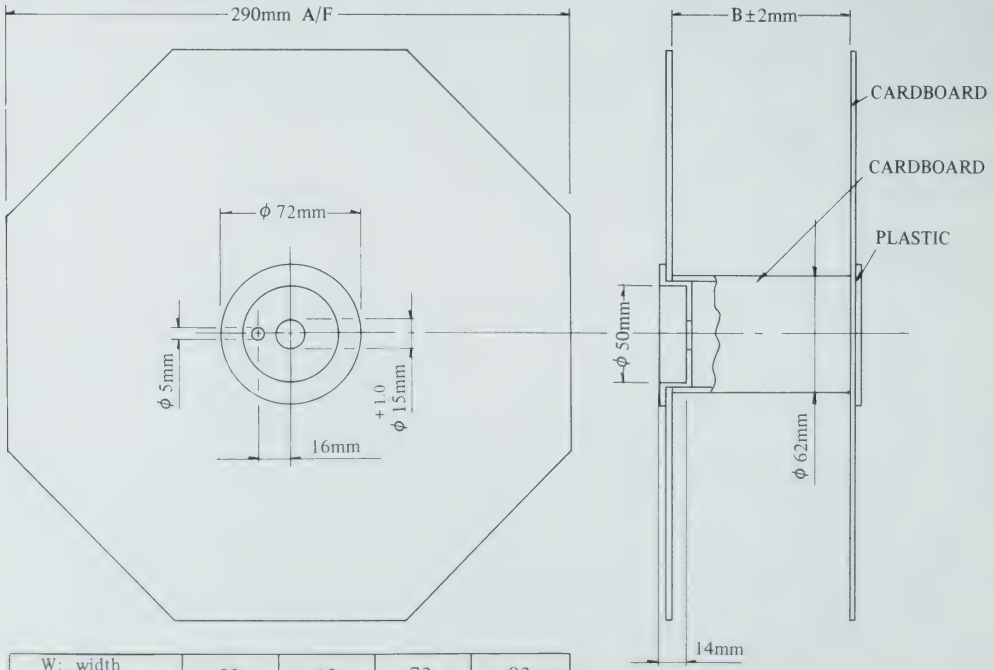
Symbol	Dimension (mm)
D	5, 6, 8, 10
L	13 – 24
d	0.5, 0.6, 0.8
P	5.0, 10, 15 (±0.4)
W	$52^{+1.5}_{-1.0}$, $63^{+1.5}_{-1.0}$, 73±1.5, 93±1.5
g	0.8 max
$L_1 - L_2$	1.4 max
Z	1.2 max
t	3.2min. (Lead ends shall not extend beyond the tape more thean 1.6 max)
T	5 – 6.5

NOTES:

This specification conforms with EIA standard RS-296-D.

1. Taping
   - 1.1. Case diameters 5mm to 10mm can be supplied taped & reeled.
   - 1.2. Unless otherwise specified, the cathode tape shall be coloured and the anode tape shall be white.
   - 1.3. A minimum 300mm leader tape shall be provided before the first and after the last capacitor on the reel.
   - 1.4. Dimensions are shown in Fig. 1.
2. Reeling
   - 2.1. Taped capacitors shall be wound on a reel shown in Fig. 2.
   - 2.2 Kraft paper shall be wound between layers of capacitors for capacitor protection.
   - 2.3. After winding the taped capacitors on the reel, a single sided corrugated cardboard strip shall be wound over the capacitors. (one wrap)

Figure 2: REELING



W: width between tapes	52	63	73	93
B: width between flanges	70	82	92	112

PERFORMANCE DATA

DC LEAKAGE CURRENT Capacitors shall initially be pre-conditioned at standard atmospheric conditions by applying rated voltage to them through 1K Ohm series resistor for 30±5 minutes, at least 24 hours and not more than 48 hours before measurement of DC Leakage Current.

RIPPLE CURRENT For frequencies and temperatures other than those specified on the individual sheets, use the following multipliers unless otherwise stated on the sheets.

FREQ. HZ / °C	60	120	400	1K	10K	100K
85	0.8	1	1.1	1.35	1.5	1.5
75	1.1	1.4	1.55	1.9	2.1	2.1
65	1.2	1.6	1.75	2.1	2.4	2.4
45	1.5	1.9	2.1	2.5	2.8	2.8
25	1.8	2.25	2.5	3	3.3	3.3

SURGE TEST (Standard Polar Units)

After the appropriate D.C. surge voltage has been applied through a 1K Ohm resistor at the rate of 30 seconds on, 4.5 minutes off for 1000 cycles at 25°C, the following limits shall apply.

Capacitance Change : ±10% max of initial value.
Dissipation Factor : Less than 150% of specified value.
D.C. Leakage Current : Within specified value.

LIFE TEST (Unless Otherwise Stated On Individual Sheets)

After application of rated voltage at 85°C for 1000 hours, the following limits shall apply when the capacitor has been stabilized at 25°C.

Capacitance Change : ±20% max of initial value.
Dissipation Factor : Less than 150% of specified value.
D.C. Leakage Current : Within the specified value.

SHELF TEST (Unless Otherwise Stated On Individual Sheets)

After the capacitor has been subjected to 85°C for 500 hours with no voltage applied, the following limits shall apply when stabilized at 25°C.

Capacitance Change : ±20% max of initial value.
Dissipation Factor : Less than 150% of specified value.
D.C. Leakage Current : Less than 200% of specified value.

PERFORMANCE DATA

LEAD PULL TEST Each lead shall withstand a steady axial pull for 10 seconds without damage to the capacitor as follows:

LEAD DIA.	STATIC LOAD
0.5 mm (0.020 in.)	0.5 Kg (1.1 lb.)
0.6 mm (0.025 in.)	1.0 Kg (2.2 lb.)
0.8 mm (0.032 in.)	2.5 Kg (5.5 lb.)

LEAD BEND TEST With the capacitor held in the vertical position, attach a weight to the lead as specified in the table below. Slowly rotate the capacitor 90°C to a horizontal position then return to the original position. This constitutes one bend. Repeat the motion in the opposite direction to complete 2 bends. The lead shall not break or crack.

LEAD DIA.	STATIC LOAD
0.5 mm (0.020 in.)	0.25 Kg (0.55 lb.)
0.6 mm (0.025 in.)	0.5 Kg (1.10 lb.)
0.8 mm (0.032 in.)	1.0 Kg (2.20 lb.)

SAFETY VENT Case diameters of 8 mm and larger for axial lead units and 10 mm and larger for radial lead units are equipped with a safety vent in the rubber sealing. Case venting for 10 mm and larger radial lead units can be supplied on request. Case venting is standard on large can types.

EPOXY SEAL Aluminium electrolytic capacitors are susceptable to damage by halogenated hydrocarbon solvents. When the use of such solvents is necessary an epoxy seal is recommended.

MARKING Minimum markings are manufacturers name, capacitance value, working voltage, polarity indication, place of origin. Special markings to customers specifications can be supplied when required.

REVERSE VOLTAGE (Polar Units) Reverse voltages not exceeding 1.5 volts may be applied to the capacitors without causing significant changes in their performance.

IF YOU HAVE ANY QUERIES
CONCERNING RICHEY CAPACITORS
PLEASE CONSULT US
OR
YOUR RICHEY REPRESENTATIVE

DUE TO CONTINUING IMPROVEMENTS IN DESIGN
SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

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